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Hours of Work as Related to Output and Health of Workers

BOOT AND SHOE INDUSTRY

Research Report Number 7
June, 1918

National Industrial
Conference Board

National Industrial Conference Board

15 BEACON STREET, BOSTON, MASS.

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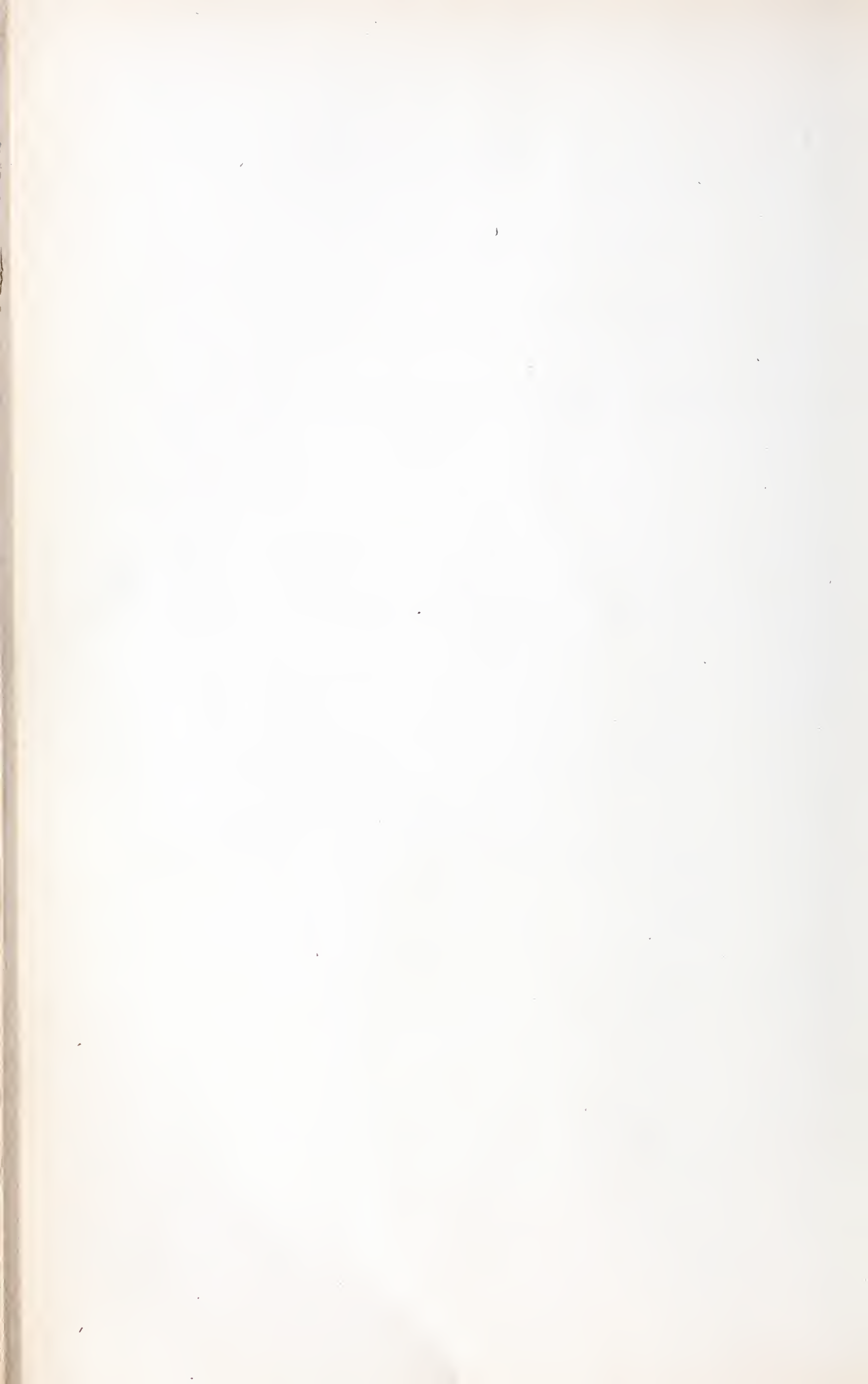
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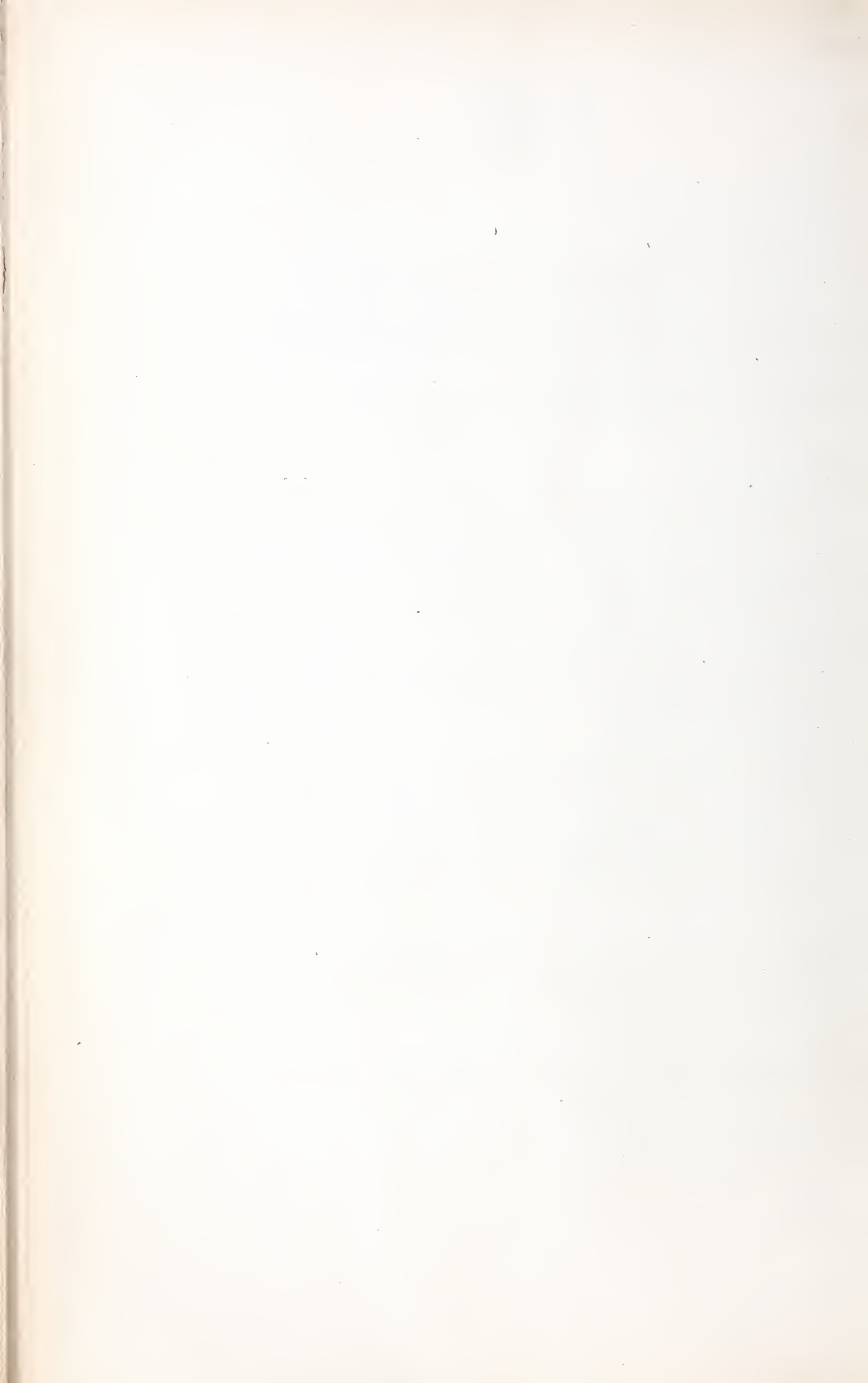
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Foreword

THIS report is the second of a series which the National Industrial Conference Board is preparing, based on an investigation of the hours-of-work problem in major industries.

The purpose of the investigation is to establish the facts of this controversial subject and to present such conclusions as are clearly warranted by a scientific analysis of these established facts. The investigation was not undertaken with the intention of attacking or defending a workday of any specific length, but, instead, to assemble the available results of actual experience.

The discussion of hours of work should be sharply distinguished from that of a basic workday. The latter is primarily a wages problem, but is often confused with the problem of determining what number of hours of work per day or per week will be most productive without impairing the health of workers.

Conclusions as to the proper length of workday, moreover, must take into account not only the effect on output and on health, but also the need of the worker for a reasonable period of leisure for recreation, home life, and self-development.

The problem varies so widely in different industries — because of differences in type of worker, in character of product, in management, and particularly in the extent to which automatic machine processes influence results—that the experience of any one industry must not be taken as representative of industry in general.



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Hours of Work as Related to Output and Health of Workers

BOOT AND SHOE INDUSTRY

INTRODUCTION

This report presents an analysis of experience with reductions in hours of work in the boot and shoe industry, in relation to efficiency, as measured by output, and to the health of workers.

To assemble this experience, schedules of inquiry were sent to the members of the National Boot and Shoe Manufacturers' Association and to a large number of other shoe manufacturers; where necessary, the information was confirmed or amplified through personal visits by field investigators who also interviewed representatives of several labor organizations prominent in the industry.

With respect to output, the investigation has thus far been chiefly concerned with what may be termed factory production in the narrow sense of immediate results. In view of the urgent necessity for maintaining maximum production of those commodities essential to the conduct of the war, the efficiency of immediate factory production is of primary importance, subject, of course, to the proper safeguarding of the health of workers. In final conclusions as to the most desirable arrangement of hours-of-work schedules, there must be taken into account not merely factory production, but also the question as to what schedule of hours will, in the long run, best maintain the productive period of the worker's life, conduce to self-development, promote the welfare of the community, and generally raise the standard of citizenship among industrial workers.

The importance of these so-called social factors in the hours-of-work problem must be clearly recognized. Their place in the problem is as real as either the output or the health factors. Since, however, they are not peculiar to any one industry, but are more or less common to all,

they will be discussed in a later report rather than in connection with each particular industry.

The information gathered relates to the most recent reductions in hours; in the great majority of cases, this was in 1916 and 1917. Because of unusual conditions incident to the war, comparisons of output are somewhat less satisfactory than similar comparisons presented in a similar report for the cotton manufacturing industry.¹ Most of the reductions in hours of work discussed in that report were made several years prior to the war, when industrial conditions were comparatively normal. In discussing results of reductions in hours in the boot and shoe industry it must be considered, on the one hand, that high wages in wartime have been an incentive to unusual effort, and, on the other hand, that certain conditions have led to a spirit of indifference and reduced efficiency. Since these factors tend to offset one another, and since they had been in effect in most cases for a considerable period prior to the reductions in hours, conclusions should not be invalidated. Complaint is rather general among employers, however, that war conditions have tended to impair rather than to increase the efficiency of workers. Furthermore, owing to the shortage of labor, manufacturers have been forced in some cases to employ a class of help which in normal times would not be considered acceptable.

Since most of the reductions in hours here studied were made recently, changes in machinery do not seriously complicate the problem, as highly perfected methods of boot and shoe production had already been generally introduced.

In analyzing the information obtained, it is necessary to take account of many collateral conditions aside from the reductions in hours, such, for instance, as: size of the establishment; *actual* hours of work as contrasted with *nominal* factory schedule hours; methods by which reduction in hours was effected, that is, whether by omitting work on Saturday afternoon, or by shortening each workday; influence of local labor organizations and social customs; labor turnover; changes in speed of machinery; differences in systems of management; changes in rates of wages; and methods of wage payment. These and many

¹See National Industrial Conference Board Research Report No. 4. "Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing."

other factors enter into the problem; while it is not possible in all cases to make a quantitative allowance for them, it is essential to bear them in mind when analyzing results.

STATISTICAL BASIS OF THIS REPORT

Replies to the schedule of inquiry were secured from 138 establishments,¹ with 63,982 employees. Information was obtained by field investigation from 52 other establishments with 34,197 employees, making a total of 190 establishments and 98,179 employees. Of the establishments included, 94, or 50%, had reduced hours of work in recent years, and 77, or 40%, reported the effect on output. A sufficient basis is therefore afforded for determination of the effects of such reductions for the industry as a whole. The following table shows the number of establishments and employees included in the study, by states:

TABLE I: GEOGRAPHICAL DISTRIBUTION OF ESTABLISHMENTS COVERED BY THE INVESTIGATION, 1917.

(National Industrial Conference Board.)

States	Establishments	Employees
<i>Total</i>	<u>190</u>	<u>98,179</u>
Maine	11	6,439
New Hampshire	8	3,832
Massachusetts	66	41,257
New York	36	22,737
New Jersey	6	1,612
Pennsylvania	24	4,058
Maryland	2	237
Virginia	1	1,198
Georgia	1	146
Ohio	13	6,862
Indiana	2	229
Illinois	2	1,152
Michigan	1	348
Wisconsin	9	2,614
Missouri	6	5,318
Utah	1	80
California	1	60

¹Throughout the report "establishment" is used to designate a corporation, partnership, or individual submitting a schedule. Where a single management operating several plants returned a consolidated schedule, this necessarily was treated as one establishment.

The extension of the boot and shoe industry has been westward into the Mississippi Valley, and not southward, as in cotton manufacturing. Thus the geographical distribution in relation to climate and to racial, social, and civic factors is more uniform for the shoe industry than for cotton manufacturing.

A comparison of the number of establishments and employees included in this report with United States Census data for 1914 shows a noticeably similar percentage distribution by states. Such a percentage comparison follows:

TABLE 2: PERCENTAGE DISTRIBUTION OF ESTABLISHMENTS AND EMPLOYEES COVERED BY THE INVESTIGATION, IN 1917, AS COMPARED WITH THAT IN U. S. CENSUS OF MANUFACTURES FOR 1914.

States	Establishments		Employees	
	N. I. C. B.	Census	N. I. C. B.	Census
<i>Total</i>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Maine	5.8	3.7	6.6	4.6
New Hampshire	4.2	4.1	3.9	6.8
Massachusetts	34.7	34.2	42.0	40.0
New York	19.0	17.3	23.2	13.7
New Jersey	3.2	3.1	1.6	2.0
Pennsylvania	12.6	9.7	4.1	6.9
Virginia . . . . .	.5	.6	1.2	.8
Ohio	6.8	4.6	7.0	7.5
Illinois	1.1	3.5	1.2	3.2
Michigan . . . . .	.5	1.8	.3	1.1
Wisconsin	4.7	4.5	2.7	3.0
Missouri	3.2	3.6	5.4	6.9
All other states	3.7	9.3	.8	3.5

While the geographical distribution of establishments covered by this report is thus strikingly similar to that of the U. S. Census, there is considerable difference in respect to average size. Practically one-half the establishments reported in the U. S. Census employed 50 workers or less, while but a small proportion of those covered by this report are so small. It should be observed that the U. S. Census records each factory as an establishment, while in this report all plants operated by the same management

are treated as a single unit.¹ The range of size among establishments included in this report is well adapted to the study of the hours-of-work problem.

BROAD FEATURES OF THE BOOT AND SHOE INDUSTRY

Certain distinguishing features of the boot and shoe industry should be taken into account in considering the evidence presented in this report.

1. Although machine processes have been developed to a high degree, and modern machinery is almost universally employed, even in comparatively small establishments, the greater part of the work is essentially "hand-time" work. For instance, in the operation of a "clicking" machine, which cuts out, by die process, the various parts of the upper leather, considerable time must be spent in carefully placing the leather by hand to insure economical and accurate cutting, whereas the machine operation of actual cutting is almost instantaneous. Again, in lasting, the operator must manipulate the shoe during the entire process. In practically every operation, production ceases when the operator leaves the machine.

The large part which handwork plays in shoe manufacturing differentiates it sharply from the "machine tending" which characterizes many operations in cotton manufacturing,² and it unquestionably has an important bearing on the problem of maintaining output when hours of work are reduced.

2. In some establishments, particularly the larger ones, the entire process of manufacture is highly organized.

¹The numbers of establishments and employees, as reported by the Census of 1914, were as follows:

States	Estab- lishments	Em- ployees	States	Estab- lishments	Em- ployees
<i>Total</i>	<i>1,355</i>	<i>191,555</i>	Virginia	8	1,555
Maine	50	8,815	Ohio	62	14,461
New Hampshire . .	55	12,937	Illinois	47	6,071
Massachusetts . .	464	76,944	Michigan	24	2,035
New York	235	26,193	Wisconsin	61	5,772
New Jersey	42	3,834	Missouri	49	13,169
Pennsylvania . .	131	13,184	All other states .	127	6,585

²See National Industrial Conference Board Research Report No. 4. "Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing," p. 3.

The various parts are worked up in accordance with a carefully arranged schedule and moved forward from department to department with almost clocklike precision, so that the work of every room or department almost exactly dovetails into that of the others. This makes it possible to formulate a schedule or routing system for a day's production, which the factory force is expected to maintain. In some establishments reports of the amount of work done are required at hourly or other frequent intervals.

3. Nearly all processes in the boot and shoe industry are characterized by speed. A more detailed reference to this matter is given in the chapter on health.¹

4. The investment required for machinery is not relatively large. One reason for this is that a large part of the machinery equipment, instead of being owned by shoe manufacturers, is leased on a royalty basis.

5. There is an excess of capacity in the industry. It has been stated that the boot and shoe establishments of the country, if operated to full capacity, could produce a normal year's requirements in seven months.

6. The work is largely on a piece-rate basis; in the establishments covered by this investigation, pieceworkers on an average constituted about 68% of the working force.

7. The hours of pieceworkers are often irregular. This, as will be clearly brought out in the course of the discussion, has a very important bearing upon the significance of results reached in certain establishments under different hours-of-work schedules.

8. Materials and styles change frequently, in many cases to such an extent as to render incomparable the output under different hours-of-work schedules. Thus, increasing the height of the shoe increases the time consumed in certain manufacturing processes; a change from oxfords to high shoes, or from leather to cloth tops likewise materially influences the output.

9. A substantial proportion of workers in the industry are members of unions, but union representation varies

¹See pages 58 to 60.

greatly in different localities. Some shoe manufacturing centers are known as union districts; others are practically without union representation.

10. Wages, while rather lower than in many industries where skilled labor is extensively employed, are relatively higher than in the textile and certain other industries where the character of the work is broadly similar. Census figures, for instance, indicate that earnings of boot and shoe workers in 1914 were about 30% higher than the combined average earnings for workers in four leading textile industries.¹

11. The proportion of women workers, practically all on piecework, is an important feature of the industry. In certain departments women are employed almost exclusively. The proportion of men and women workers in the establishments covered by the investigation was as follows:

	<i>Total</i>	Employees ^a	Percentage
		80,797	100.0
Men		52,558	65.0
Women		26,667	33.0
Boys		964	1.2
Girls		608	.8

^aThirty establishments with 17,382 employees did not report as to sex of the workers.

PRINCIPAL OPERATIONS IN BOOT AND SHOE MANUFACTURE

Efficiency in the shoe industry is peculiarly dependent on the regularity with which each operation is completed so that there shall be no interruption in performing subsequent operations. By the so-called “sheet” system all departments are co-ordinated on a schedule which must be closely followed. Each detail of a day’s work or a half-day’s work is carefully planned to include the exact number of parts which enter into manufacture of the number of pairs or cases of shoes which constitute the

¹These four industries were cotton goods, hosiery and knit goods, silk goods, woolens and worsteds.

standard output of a day or a half-day.¹ Each department, whether operated by day or pieceworkers, should get out its product on time, since any delay in one department obstructs and delays the work of the next. Moreover, since most shoe production is for current orders, and since the style and quality of future demands cannot be anticipated, the manufacture of stock orders in slack times is impracticable.

Under normal conditions about three weeks is required for the manufacture of a shoe from start to finish. The work can be rushed through in two weeks, or in slack time it may take six weeks, but in general the "routing" covers from eighteen to twenty days.

More than 50 machine operations are performed in an ordinary boot and shoe factory; in some shops the number is over 150. The number of independent processes, including hand operations, is still greater; fully 200 well-defined processes can be distinguished. This involves a high degree of specialization and much of the work is therefore repetitive and monotonous.

A description of the processes of manufacture is outside the scope of this report. Since, however, there are wide differences in respect to severity of manual effort, nerve strain, health hazards, and other factors involved, a brief

¹The sheet system was described by one manufacturer as follows:

"A sheet is a factory production unit of either one-half or one whole day's work, i.e., composed of a collection of cases or lots of shoes put up to meet the daily factory production capacity and held to certain style and construction limits to meet the factory layout.

"An order having been passed by the Order Department is sent to the Tag Department to have separate tags made out for each style. A tag represents a case lot of usually 12, 24, 36, or 48 pairs of shoes which may be the whole or portion of a customer's style purchase. This tag bears the customer's name, run of sizes, and all construction detail of the shoe. The tags are then filed away according to delivery dates. When it comes time to put shoes of a certain delivery date into the works, these tags are taken by the 'Putting Up' or Planning Department and divided into sheets according to factory capacity and limits.

"The cases which make up a sheet are lined up and assigned a case number, having the numerical standing of the case on the sheet and preceded by the sheet number, e.g., 10014 represents sheet 10, case 14. This number is stamped on the lining of the shoe, thereby always distinguishing it.

"This same case number is entered on all production checking sheets and coupons, so that a case upon passing through a production station has its production coupon clipped and is checked off accordingly, then forwarded to the production office, where it is checked off on hourly report and regular production chart.

"In the factory each case of shoes bears a colored disc with a number, the color representing the day and the number of case, thereby making it quite easy to detect and put through the day's work in its chronological order of delivery."

account of some of the principal operations will be of service.

The main departments or processes may be broadly grouped as follows:

Cutting, Upper Leather	Bottoming	} sometimes combined
Cutting, Sole Leather	Making	
Fitting	Finishing	}
Stitching	Treeing and Dressing	
Lasting	Packing and Shipping	

UPPER LEATHER, OR CUTTING DEPARTMENT. In this department the leather used in making the uppers of the shoe is carefully selected, measured, and cut into the desired shapes either by hand or by machine. Each skin or hide furnishes a large variety of pieces; remnants are often used for small parts of the shoe. Cloth tops and linings are similarly cut. Another process in this department is "skiving," which consists of beveling the edges of the various upper leather parts on the flesh side, folding them and cementing them back, so that in the completed shoe they have a smooth-finished edge, unless a raw edge is desired. The parts thus cut and prepared are then counted, marked, and tagged in the assembling room of the upper leather department and forwarded as needed to the stitching room.

Except for hand cutting of leather, the work in the upper leather department is not severe; much of it is performed by women. Cutting, however, which is distinctly laborious, is generally done by men. This operation calls for a high degree of skill and judgment. It is usually paid for on a time-rate basis, or, where the piece-rate system is used, a bonus is given for saving material, so that the operative will not be tempted to sacrifice quality of work for quantity. Skiving is done by both men and women. Women are chiefly employed in tagging, stamping, and other assembling work.

SOLE LEATHER DEPARTMENT. In the sole leather department the soles are cut, in some cases channeled,¹ and otherwise prepared. This work requires judgment to obtain uniformity of leather and great dexterity to pre-

¹Channeling, in the case of the McKay process, consists of cutting a slit at a very acute angle in the outer sole. The top portion of this is cemented back over the stitches which have in the meantime been inserted. In this way the stitches do not show on the bottom of the sole. In the Goodyear process the inner sole is channeled to allow for the fastening of the welt through the upper. (See page 11.)

vent spoiled work. It is a distinctly laborious process and is almost exclusively performed by men. The heels, counters, and boxes are made in this department when they are not bought in the open market.

From the sole leather department the parts are forwarded to the making department (lasting, bottoming, and heeling).

STITCHING DEPARTMENT. In this department the upper leather and lining parts, prepared in the upper leather department, are assembled and stitched together, making a complete upper. One of the most important of the stitching operations is "vamping," i.e., stitching the "quarter" or top part of the upper to the lower portion, or vamp.¹ Before the leather parts are sewed, the lining is fitted together, trimmed, and later stitched² to the top portion of the upper by what is known as the "closing on" process. Tips are also attached, buttonholes and eyelet-holes made, buttons sewed on, and eyelets inserted.

Except in the vamping process, where some of the heavier stitching is usually performed by men, the greater part of the work in this department is performed by women. While not especially laborious, it requires close application and great dexterity. It is practically all machine work, and most of it is monotonous. Some of the machine operations involve considerable nerve and eye strain.

LASTING DEPARTMENT.³ Here the upper of the shoe, as fitted and stitched together in the stitching room, is placed on a last, to the bottom of which the inner sole has been tacked. In this position the box and counter filling are inserted between the lining and the upper leather. The upper is then placed on a "pulling-over machine," which is one of the most ingenious in the whole process of shoe manufacture. With pincers that act almost with the dexterity of the human hand, the upper is drawn tightly about and fitted to the last, to which it is then temporarily tacked. After leaving the pulling-over machine the shoe is placed on another machine, where the sides are fitted still more closely to the last; then the toe and heel portions of the upper are beaten or "wiped" up to the

¹The vamp is that portion of the upper of the shoe which is attached to the sole. It extends the complete length of the shoe; frequently it has only a single seam at the heel, although in some shoes it has a seam on each side as well.

²Sometimes the lining is pasted on.

³The lasting, bottoming, and heeling departments are sometimes referred to collectively as the making department or the gang room.

exact lines of the last. After lasting, the edges of the upper are trimmed, to get rid of unnecessary leather.

Several of the operations involve considerable muscular effort, as well as great accuracy and good judgment; the operative usually has to stand most of the time. Men are almost exclusively employed in lasting processes.

BOTTOMING DEPARTMENT. The upper portion of the shoe thus fitted to the last is now ready to be attached to the outsole, which has been cut and prepared in the sole leather room. There are four principal methods of attaching the sole to the upper.

1. *The Goodyear Welt Process.* In this process a narrow strip of stiff leather — the welt — is first sewed to the bottom edge of the vamp through the channel in the inner sole, extending from the front of the heel on one side clear around the shoe to the heel on the opposite side. By an ingenious machine process involving a curved needle and awl, the stitching passes through the welt, the upper, and the channel, or "lip," of the insole in such a way as to leave no stitches visible in the interior of the shoe. Thus sewed, the welt extends outward a short distance from the shoe in all directions (except around the heel) much like a miniature snowshoe. The outsole is later cemented to the insole¹ and then sewed to the welt. The welt process produces a shoe of great flexibility and has the advantage of leaving no stitches in the interior of the shoe.

2. *The McKay Process.* In the McKay process no welt is used, and the outsole, the insole, and the edge of the upper which lies between them are sewed directly together by a straight needle. This leaves a row of stitches visible around the inside of the shoe, over which a lining is ordinarily placed. The outsole is generally channeled in such a way as to conceal the outside stitches. This method of sewing is chiefly used in medium or low priced shoes.

3. *Turn Process.* In the "turn" method the shoe is made inside out and then turned back by machinery. It is used extensively in the manufacture of fine grades of women's shoes and slippers.

4. *Peg or Nail Process.* In such shoes the outsole is fastened to the insole by tacks, nails, or screws. This process is used only for cheap and heavy grades of shoes.

¹The welt method leaves a space between the outsole and insole; this is usually filled in with cork.

After the outsole has been attached, its edges are trimmed by a process known as rough-turning. The bottom of the shoe is also carefully leveled and smoothed and various other buffing operations are performed. The heel is attached in this department by a machine process. As it comes from the stock room the heel is somewhat larger than is required in the finished shoe and has to be trimmed down, shaped, and burnished. In some factories heeling is done in a department devoted to that work alone.

Much of the labor in the bottoming department requires considerable muscular effort, and in some processes the shoe has to be held in such a position that the operation is very fatiguing. The work is almost exclusively performed by men.

A feature of much of the work in this department, such as the trimming, scouring, and buffing processes, is the generation of fine particles of dust, constituting a distinctive health hazard. To meet this hazard various devices have been generally introduced in shoe factories. These are referred to on page 56.

FINISHING DEPARTMENT. In this department, sometimes called the dressing or treeing department, the shoe is cleaned, inspected, and, if necessary, repaired (or rejected). It is then treated with oil or other dressing. Heel pads are placed in welt shoes, sole linings in McKay shoes, stray tacks removed, laces inserted, and trade-mark stamps affixed.

In treeing, the shoe is placed on a form or tree and ironed. This tends to perfect its shape and to add to its general attractiveness.

Work in this department is performed by both men and women.

PACKING AND SHIPPING DEPARTMENT. In the packing department each pair of shoes is wrapped in tissue paper and put in a cardboard box, or other container, which bears a label stating the style, size, and other details. This work, which is light but monotonous, is generally performed by women. Very cheap shoes are packed loose in boxes or barrels.

In the shipping department the cardboard boxes are packed in cases and the usual shipping details attended to. This work is chiefly performed by men and boys.

PRESENT HOURS OF WORK IN THE BOOT AND SHOE INDUSTRY

According to the U. S. Census of 1914, less than 15% of workers in the boot and shoe industry were in establishments where prevailing hours were fewer than 54 per week.¹ In 1917, over 62% of employees included in this investigation were in such establishments. While the two percentages are not strictly comparable, the results nevertheless clearly indicate that a rather rapid shortening of the workday has taken place in the industry in recent years. Indeed, even since this investigation was commenced, hours have been further shortened in some localities.²

The following table shows the number and percentages of establishments and employees covered by the investigation, grouped according to the prevailing schedule hours per week:

TABLE 3. NUMBER AND PER CENT OF ESTABLISHMENTS AND EMPLOYEES COVERED BY THE INVESTIGATION, GROUPED ACCORDING TO PREVAILING HOURS PER WEEK, 1917.

(National Industrial Conference Board)

Schedule hours per week after reduction	Establishments		Employees	
	Number	Per cent	Number	Per cent
<i>Total</i>	<u>190</u>	<u>100.0</u>	<u>98,179</u>	<u>100.0</u>
Under 48	3	1.6	292	.3
^a 48 and under 49	4	2.1	12,215	12.4
49 " " 50	6	3.2	1,379	1.4
50 " " 51	37	19.5	25,530	26.1
51 " " 52	2	1.1	202	.2
52 " " 53	24	12.6	15,433	15.7
53 " " 54	6	3.2	6,042	6.2
54 " " 55	39	20.5	14,636	14.9
55 " " 56	50	26.2	16,309	16.6
56 " " 57	4	2.1	1,217	1.2
57 " " 58	4	2.1	1,740	1.8
58 " " 59	4	2.1	1,008	1.0
59 " " 60	3	1.6	1,416	1.4
60 and over	3	1.6	515	.5
Unreported	1	.5	245	.3

^aSee p. 24.

¹U. S. Census of Manufactures, 1914. p. 483.

²Thus, in the Lynn district a 50-hour nominal schedule was introduced in some factories on January 1, 1918.

Four groups are sharply distinguished in this table: the 55-56-hour group, which includes 26.2% of the establishments and 16.6% of employees; the 54-55-hour group, with 20.5% of establishments and 14.9% of employees; the 52-53-hour group, with 12.6% of the establishments and 15.7% of employees; and the 50-51-hour group, with 19.5% of establishments and 26.1% of employees. These four groups include 150 of the 190 establishments reporting, and 71,908 of the total of 98,179 employees.

More than 93% of the total number of workers were in establishments with schedule hours of less than 56 per week; more than 62%, as already noted, where the hours were less than 54. The actual percentages are, in fact, slightly higher, since small groups of workers in some establishments were on shorter nominal schedules than those generally prevailing for the working force as a whole.¹

These figures are in sharp contrast with those published in the report on "Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing,"² which showed that only 3½% of employees in northern cotton mills were in establishments with work schedules of less than 54 hours per week. Nominal schedules in the northern cotton industry were practically controlled by state legislation, which, though directly applicable to women, really affected hours for men as well. In the boot and shoe industry, the limitation of hours of work for women has also usually had the effect of shortening hours for men. Many boot and shoe establishments, however, have shortened the work-week below the legal limit for women; in Massachusetts, for instance, where the legal limitation of hours for women is now 54 per week, no less than 38 out of 66 boot and shoe establishments covered by this report are operated on shorter schedules.

One reason for this difference in work schedules between the boot and shoe industry and the cotton manufacturing industry appears to be the greater strength of unions in the former; another factor has been the threat of labor disturbance in certain localities. Perhaps more important

¹ As pointed out in the first column of the table, these hour groups include establishments working on the lower schedule of hours up to but not including the higher schedules.

² National Industrial Conference Board Research Report No. 4.

than either is the difference in the character of the work in the two industries, which, as shown later, makes it somewhat more feasible to shorten the day in the boot and shoe industry than in cotton manufacturing.

SATURDAY HALF-HOLIDAY

The Saturday half-holiday is almost universal in the boot and shoe industry. Of 138 establishments replying to the schedule of inquiry, only 14, or 10%, operated on Saturday afternoon. These exceptions were not confined to any one locality, but were rather generally distributed among the various states. Of these 14 establishments, only one had a schedule of less than 54 hours per week. The adoption of the Saturday half-holiday has in some cases been a response to legal reductions in weekly hours of work, some establishments preferring to make such reductions by shutting down altogether for one half-day rather than by slightly shortening the hours for each day. In the main, however, the adoption of the practice is the reflection of the modern social tendency toward allowing such a week-end break for rest, recreation, and attention to personal matters.

As illustrating the difference in local custom in the boot and shoe industry, it may be noted that the Saturday half-holiday became rather general in the Lynn, Mass., district as early as 1910, while it did not come into general practice in the Brockton, Mass., district until 1917. Yet not only are the two cities situated near each other, but, in both, general labor conditions are in some respects similar.

Several manufacturers contended that the Saturday half-holiday proved disadvantageous. In particular, it was asserted that in small communities located at a short distance from large cities there is a disposition among workers to spend Saturday evening in the city, and that preparation for these week-end trips interfered with work on Saturday mornings. One manufacturer said in this connection:

Saturday morning in this plant is unsatisfactory; the force get ready to go home an hour or two before the whistle blows.

Another manufacturer said that his employees began preparations for leaving the factory about eleven o'clock.

on Saturday morning in order to catch the twelve o'clock train for the city.

One manufacturer who opposed the Saturday half-holiday expressed the opinion that as much work could be turned out in 50 hours per week in six days of equal length as in 54 hours with a Saturday half-holiday. This plant, however, was located in an agricultural section where there were comparatively few competing industries.

Nevertheless, while from the standpoint of production and overhead charges the Saturday half-holiday has its disadvantages, a majority of employers in the boot and shoe industry apparently accept the practice without objection and even with satisfaction.

The influence of the Saturday half-holiday on output is discussed on page 45.

NOMINAL HOURS COMPARED WITH ACTUAL HOURS

A fact which has an important bearing on the study of efficiency under different hours-of-work schedules in the boot and shoe industry is that hours are often highly irregular. One reason for this appears to be a lack of demand sufficient to keep all plants constantly occupied, or an irregularity of demand. As a result, some factories frequently close down a half-day or longer at a time. For instance, the hours of one group of four factories when nominally working 50 hours per week were as follows:

		FACTORY			
		A	B	C	D
May	5, 1917	30	40	34	50
"	12	30	40	36	50
"	19	38	50	40	50
"	26	50	50	40	50
June	2	41	41	33	41
"	9	41	41	33	41
"	16	50	50	40	50
"	23	50	50	33	41
"	30	50	50	40	50
July	7	0	0	0	0
"	14	0	0	0	0
"	21	50	50	46	50
"	28	50	50	50	50

These figures are not presented as typical, but as more or less illustrative of a condition that prevails from time to time in many establishments in the industry.

It is obvious that any such irregularity of work hours injects a highly complicating factor into comparisons of output under different hours-of-work schedules.

IRREGULAR HOURS OF PIECEWORKERS

A further difficulty arises from the fact that pieceworkers (who, as already stated, constitute about 68% of the employees) frequently do not work the full number of hours called for by the nominal or factory schedule. Even with dayworkers there is, of course, a margin of lost time due to tardiness, illness, or occasional absence for other causes, so that the number of hours spent in the factory is somewhat less than that prescribed by the factory schedule.

This is characteristic of all industries. An average absence of from $2\frac{1}{2}$ to 3 hours per week by dayworkers under a nominal schedule of 52 or 54 hours would not be unusual. In the case of pieceworkers in the boot and shoe industry, however, the margin between the hours actually spent in the factory and the nominal or schedule hours often is large. Investigation showed that it is a rather common practice among pieceworkers, especially in certain districts, to leave the factory considerably before the scheduled hour for closing, and in numerous cases the actual time spent by pieceworkers in the factory were 4, 5, or 6, and in some cases even 8 hours less than the nominal weekly schedule. The following statements of employers are fairly representative:

Pieceworkers do not as a rule work 50 hours, leaving anywhere from two to five o'clock in the afternoon.

Pieceworkers seldom put in more than 45 hours.

Pieceworkers usually leave the factory from two o'clock on.

Good pieceworkers rarely work more than 40 hours per week and perhaps on the average pieceworkers do not work more than 44 or 45 hours.

The average pieceworker works only 45 hours per week.

Pieceworkers rarely average more than 44 hours. Cutters and other pieceworkers work about 45 hours per week.

The majority of pieceworkers go home about three or four o'clock in the afternoon.

Pieceworkers average between 45 and 50 hours.

Eighty per cent of the workers are on piecework and do not average 44 hours per week, except in the case of lasters.

Under usual conditions, without lay-offs and blocks, the stitchers work perhaps 42 hours, the lasters and cutters 42 hours, the makers hardly 40 hours, the finishers about 45 hours, and the treers hardly 42 hours, yet practically even these hours are reduced by interruptions.

Pieceworkers seldom work their full 9 hours per day, leaving anywhere from two to five o'clock.

On the other hand, in many establishments pieceworkers observe practically the same hours as the dayworkers. The following are the statements, in substance, of several manufacturers:

Pieceworkers work pretty nearly full time. They find it necessary to do this in order to keep up their part, as they are expected to do about so many pairs a day. A certain amount of work is allotted to each machine.

The reduction from 54 to 50 hours was made in the spring of 1917. After the reduction pieceworkers worked more sharply up to the hours of dayworkers.

Ordinarily the pieceworkers work full time, but in seasons when work is slack they may not average more than 50 hours per week.

Most of the work is done on piecework, and in this plant pieceworkers put in practically a whole day. The rule is that no pieceworker can leave the factory until the whistle blows, shortly before six o'clock, without a pass. There is a record of the number of passes issued in each department, so if any department falls behind schedule, it is at once apparent whether this has been due to negligence on the part of the foreman to keep the pieceworkers busy, or to other reasons, and the fault can be immediately rectified.

The representative of another establishment said in effect:

Pieceworkers in our factories lose practically no time because of early quitting; some time ago when it was thought that one of the factories was getting rather lax in this respect, a special study was made covering a week. This study indicated that at the factory which ran best in this respect only one-half of one per cent of the employees went out early and only five-hundredths of one per cent of the total nominal hours were lost from this cause. In another factory four and three-tenths per cent of the employees left early, resulting in a loss of about twenty-nine-hundredths of nominal time, but this was exceptional and was corrected. On the whole, the loss of time in our factories due to early leaving by pieceworkers is negligible.

It is exceedingly difficult to arrive at definite figures showing the amount of time lost by pieceworkers in this way. As a rule, replies to the schedule of inquiry did not cover this point and, although particular effort was made to secure the facts, the information obtained often was not sufficiently specific to be of real value. Often no records of pieceworkers' attendance had been kept. In a group of establishments visited by field agents where the average nominal hours were 52.4 per week, the actual hours of pieceworkers, as roughly estimated by the managements, were only 48 per week, — an average difference of 4.4 hours. Since in many of these establishments pieceworkers observed nearly the same hours as day-workers, an average loss of 4.4 hours by pieceworkers for all establishments combined means that in many cases pieceworkers lost a considerably larger amount of time. It is entirely safe to say that in numerous shoe establishments working on nominal schedules of 50 to 55 hours per week, pieceworkers were absent from the factory six hours or more per week.

Such irregular attendance of pieceworkers has an important bearing on the problem of measuring output under different hours-of-work schedules. For instance, if when nominal hours were reduced the actual hours of pieceworkers remained constant, production should not be materially affected. Or if, as happened in at least one establishment,¹ the hours voluntarily worked by piece-

¹See page 38.

workers actually increased when nominal hours were shortened, it is clear that an increase in output, or even maintenance of output, could not be regarded as a response by the workers to a shorter workday.

Some of the causes of this irregularity of pieceworkers' attendance are referred to elsewhere.¹

Because of such irregularity of both nominal hours and pieceworkers' hours, and also because of the great variety in style of product, statistical data covering output under different hours-of-work schedules were secured from only a few establishments. In the main, therefore, the discussion presented in the following chapter is based on statements of manufacturers as to the results of operation under different hours of work. While an analysis of such statements does not permit of quantitative measurements of the difference in output under different work schedules, it does permit of broad conclusions as to the practicability of a given hours-of-work schedule with collateral conditions as they actually exist in the industry.

¹See page 46.

HOURS AND OUTPUT

The essential results of changes in hours of work with respect to production, as developed by the investigation, are given in the appendix table on pages 69 to 76. This table presents an epitome of the experience of those boot and shoe manufacturers who had reduced hours and who reported the result on output of such reduction; unless otherwise stated, the information applies to the most recent reduction in hours. A careful examination of the details of the table, especially the quoted statements of individual manufacturers, will give a more accurate idea of its significance; results are summarized below. Since numerous special considerations qualifying the results in individual instances cannot be reflected in such a brief summary, it is essential that the comments in the accompanying text also be carefully noted.

TABLE 4. NUMBER AND PER CENT OF ESTABLISHMENTS AND EMPLOYEES COVERED BY THE INVESTIGATION, GROUPED ACCORDING TO THE EFFECT ON OUTPUT ACCOMPANYING REDUCTION IN HOURS.

(National Industrial Conference Board)

Effect on output accompanying reduction in hours	Establishments		Employees	
	Number	Per cent	Number	Per cent
<i>Total</i>	77 ^a	100.0	62,200	100.0
Maintained	24 ^b	31.2	19,619	31.5
Decreased	53	68.8	42,581	68.5

^aThis total excludes 17 establishments which reduced hours but which did not report the effect of such reduction on output.

^bIn two establishments a slight increase was reported. See appendix table.

This table shows that of 77 establishments reporting the results accompanying reductions in hours, 24, or 31%, stated that output was maintained; 53, or 69%, that it was reduced. The percentage distribution of employees for the two groups was almost exactly the same.

It should be noted, however, that in several establishments where output was reduced the output of pieceworkers was maintained; the facts on this point are brought out in the appendix table.

The average hours of the two groups after and before reduction are given in the following table:

TABLE 5. AVERAGE HOURS AFTER AND BEFORE REDUCTION, AND AVERAGE REDUCTION IN HOURS OF ESTABLISHMENTS COVERED BY THE INVESTIGATION, GROUPED ACCORDING TO EFFECT WHICH ACCOMPANIED REDUCTION.

(National Industrial Conference Board)

Effect on output accompanying reduction in hours	Average hours after reduction	Average hours before reduction	Average reduction in hours
Maintained	52.6	56.9	4.3
Decreased	51.7	55.9	4.2

The average reduction in schedule hours was therefore practically the same for the group of establishments which reported production maintained as for the group which reported a decrease. The average work-week of the first group was, however, a little longer, both prior to and after the reduction in hours, than that of the second.

Such consolidated figures, however, are not in themselves significant, since it is imperative to know the weekly hours to which the results apply. This is indicated by the following summary: to avoid misleading impressions, this table should be read in the light of the various qualifications brought out in subsequent discussion by hour groups.

TABLE 6: SUMMARY COMPARISON OF ESTABLISHMENTS AND EMPLOYEES, BY HOUR GROUPS, ACCORDING TO EFFECT ON OUTPUT ACCOMPANYING REDUCTION IN HOURS.

(National Industrial Conference Board)

ESTABLISHMENTS				
Nominal hours per week	Number Maintained	Number Decreased	Per cent Maintained Decreased By Hour Groups	
<i>Total</i>	<i>24</i>	<i>53</i>		
48	1	1	50.0	50.0
49½ and 50	5	28	15.2	84.8
52 and 52½	7	6	53.9	46.1
53	1	..	—a—	—a—
54	6	13	31.6	68.4
55	3	5	37.5	62.5
56	1	..	—a—	—a—

EMPLOYEES				
<i>Total</i>	<i>19,619</i>	<i>42,581</i>		
48	200	12,000	1.6	98.4
49½ and 50	2,581	20,478	11.2	88.8
52 and 52½	9,140	2,213	80.5	19.5
53	171	....	—a—	—a—
54	5,904	4,991	54.1	45.9
55	615	2,899	17.5	82.5
56	1,008	....	—a—	—a—

^aPercentages not computed because only one establishment included in this group.

One important factor in the problem is the method by which reduction in hours was brought about; that is, whether by adoption of the Saturday half-holiday or by shortening hours on other days. In an industry so highly organized as the boot and shoe industry, where the different departments are so interdependent, it would naturally be expected that the elimination of an entire half-day per week would cause a reduction in output, at least for a time, although eventually the loss might be overcome by response of workers to diminished fatigue, by better organization, or in some other way.¹

¹The significance of the method by which reduction in hours was accomplished is discussed on page 45.

It is a common practice when a Saturday half-holiday is inaugurated to simply drop the "sheet" for one-half day from the weekly standard of production. Unless this half-day's lost production is made up by increased output on other days the week's total output would be reduced.

In order to bring out their significance, the data will now be analyzed by hour groups.

THE 48-HOUR GROUP

Of the 77 establishments reporting the results of reduction in work-hours, only two were operating on nominal schedules of 48 hours per week.¹ One of these, employing only about 200 workers, reported that production was maintained but that costs were increased. The other was Endicott, Johnson & Company, with plants at Endicott and Johnson City, New York, employing about 12,000 workers.

EXPERIENCE OF ENDICOTT, JOHNSON & COMPANY

The adoption of a so-called 48-hour week (see p. 25) by Endicott, Johnson & Company was due to a belief on the part of the management that the time had come for the adoption of such a schedule, rather than to an expectation that as many shoes could be made in 48 hours as had previously been made in 54. In other words, it was primarily a social rather than an economic readjustment.

A statement given out by the company soon after the change in hours was made, is, in part, as follows:²

The 48-hour week has not been effective long enough in our works to allow us to make comparative records as to the results; but our opinion is that a dayworker will do as much in 48 hours, if properly coached, and conditions made as favorable as possible, as he will in 54. This we have yet to prove, by actual demonstration, in our works; but it is a fact (already proved) that we have not added any clerical workers, and the work is being as well

¹This statement excludes two companies which were temporarily operating on shorter schedules because of slack work. One of these was on a 36-hour and the other on a 45-hour basis. Because of the temporary conditions which forced these unusually short hours, the results obviously cannot be considered representative, and they have, therefore, been disregarded in this discussion.

²Endicott, Johnson & Co., in "The 48-hour Week for Women," published by the Women's Trade Union League.

done as before; and we haven't added any additional foremen, superintendents, engineers, firemen, machinists, or mechanics, who comprise the largest part of our dayworkers. The limited number of dayworkers who work on the leather and shoes we believe will demonstrate that they can do just as much work in eight hours as in nine.

The pieceworkers, comprising at least 80% of our productive workers, were given a flat increase in their rate, equal to the hour daily given to the dayworkers. Of course, this could have but one result—an additional cost.

At a later date, a representative of the company said:

We are glad to report that in our judgment, so far as it has affected our industry, the 48-hour week has been a positive and satisfactory improvement, from every standpoint.

I can't say to you honestly that it has not cost us money. I believe it has. But it has added so much to the comfort, wellbeing, and pleasure of the help that we feel the money is well expended. I can't give you the cost in percentage, but believe it is safe to say that at least 50% of the time given is probably made up in more efficient service, and the other 50% is probably additional cost.

The attitude of the people, men and women, toward the proposition was extremely cordial.

It is clear, therefore, that while in this case the workers made up a part of the reduction in hours by increased efficiency, the total output did not equal that of the 54-hour week. It may be noted that a previous reduction from a 60-hour week to a 54-hour week in this establishment involved no appreciable decrease in output.

Certain considerations forbid the use of the experience of this company as a criterion. The most important is that the employees are expected to work 48 *actual* hours each week. The factory is opened at six o'clock in the morning. All work in excess of 48 hours is paid for as overtime and there is considerable overtime on this basis.

Strictly speaking, therefore, the Endicott-Johnson experience is not an experience with a 48-hour work schedule.

Obviously, 48 actual hours of work cannot be obtained under a 48-hour nominal schedule, since under any nominal schedule there is a margin of lost time due to tardiness or occasional absence.

Furthermore, the company's position is distinctive in several respects which have a bearing upon the hours-of-work problem. Its two factories are in localities where there is little other manufacturing activity and no union labor. Numerous welfare activities are maintained by the company, which also frequently purchases large quantities of food and other commodities in times of unusually high prices and distributes them among its employees at cost. Such factors as these, which may easily have a considerable bearing upon the efficiency of workers, must be considered when applying the experience of the company to the industry in general.

EXPERIENCE OF THE THOMAS G. PLANT COMPANY

In this connection it is interesting to note that several years ago a large shoe manufacturing establishment, the Thomas G. Plant Company, made a careful experiment with a 48-hour week. A statement of the results of this experience, made by the treasurer, Mr. W. L. Ratcliffe, to the United States Department of Commerce in 1904, was, in part, as follows:

Prior to 1898 we worked 10 hours per day, or 59 hours per week; in 1898 we voluntarily, and without a request from any one, placed our factory on a 9-hour basis, and continued on that basis for a matter of two or three years, with very satisfactory results.

We reasoned that if we could have an active 9-hour day it was superior in all respects to a more or less inactive 10-hour day. We actually turned out a larger volume, and our people averaged to make more money in 9 hours than they did in 10; there were not so many of them late, and they worked more continuously during the 9 hours; kept more steadily at it.

During 1901, after giving the matter considerable thought, we voluntarily placed our factory on an 8-hour basis, figuring that if we could have an active 8-hour day, everybody prompt in attendance, and working steadily, that we could accomplish, practically speaking, the same results as in 9 hours.

We ran along on this basis for a matter of 21 months, and proved to ourselves conclusively the utter fallacy of such a proposition. In the first place, our employees averaged to be just as late in getting to work in the morning when we started at 8 as formerly at 7.30, and we could not see, as a rule, that they were inspired to work any more steadily because they were not expected to be here but 8 hours than they were when they were to be here 9. The result was a decreased product and increased manufacturing expense. If we were to keep up our product it meant increased factory space and an additional working force, or to go back to the 9-hour basis. As we figured it, it seemed to us at the time that, all things considered, an 8-hour working basis practically meant from 7 to 7½ hours actual working time for a large percentage of our employees, which, experience demonstrated to us, was not sufficient to run our business profitably. In the cutting room, where the goods started, the 8-hour basis was a success, but so many other things come up during the process of manufacture from the starting point to the finishing point on account of occasional delays, breakages of belts and machinery, or absence of certain help at important times, sickness, etc. Everything that tended to interfere with the continual smooth moving of the product meant that we were losing just that many pairs a day through causes which seemed unavoidable and impossible to overcome, consequently a good many of our people (pieceworkers) were in turn losing something in wage because of the absence of employees who handled the work before it reached them; in other words, the factory could not finish on an 8-hour basis the same number of pairs of shoes which we started on an 8-hour basis. We therefore went back to the 9-hour day.

In the first change from 10 to 9, and then from 9 to 8 hours, we had made absolutely no change in the rate of wage paid, consequently when we went back from 8 to 9 hours we did not make any change in wages either, as a good many of our people were with us originally on a 10-hour basis.

It should be pointed out that since this company made its experiment with an 8-hour day, many changes in processes of manufacture have been developed, so that the results above outlined are not necessarily representative of those obtainable under a similar schedule at the present time. However, a representative of the company,

in a statement made before the Committee on Social Welfare of the Massachusetts Legislature in March, 1918, again asserted that an 8-hour day was not practicable for his establishment.

It should be observed, however, that in the cutting room, the 8-hour schedule proved successful, and, also, that with a 54-hour week the company not only maintained output, but somewhat increased it, as compared with a 59-hour week.

From the viewpoint of production, therefore, the reported experience with a 48-hour week has been unsuccessful. Furthermore, since two of the three establishments whose experience was available were of unusual size, and apparently in an especially favorable position to obtain best results, their inability to maintain output indicates definitely that it is impracticable at the present time to secure maximum output in the boot and shoe industry with as short a week as 48 hours.

THE 49½-50-HOUR GROUP

Thirty-three establishments reduced hours either to 49½ or 50 per week. Since it is impracticable to draw separate conclusions as to the effect of a difference of thirty minutes per week (about five minutes per day) the results for these establishments will be discussed as a whole. They are summarized in the following table:

TABLE 7: NUMBER AND PER CENT OF ESTABLISHMENTS, AND OF EMPLOYEES, WHICH REDUCED HOURS TO 49½ OR 50 PER WEEK, AND THE PREVIOUS SCHEDULE HOURS, GROUPED ACCORDING TO EFFECT ON OUTPUT.

(National Industrial Conference Board)

Effect on output	Previous hours ^a	Establishments		Employees	
		Number	Per cent	Number	Per cent
<i>Total</i>		<u>33</u>	<u>100.0</u>	<u>23,059</u>	<u>100.0</u>
Maintained . . .	$\left\{ \begin{array}{ll} 57\frac{1}{2} & (1) \\ 55 & (3) \\ 54 & (1) \end{array} \right.$	5	15.2	2,581	11.2
Decreased . . .	$\left\{ \begin{array}{ll} 58 & (1) \\ 55 & (4) \\ 54 & (23) \end{array} \right.$	28	84.8	20,478	88.8

^aFigures in parentheses represent the number of establishments.

This table shows that of the 33 establishments reducing hours to $49\frac{1}{2}$ or 50 per week, only 5 reported that production was maintained. These 5 establishments, moreover, employed only about 11% of the total number of workers in this group. Experience with a $49\frac{1}{2}$ or a 50-hour schedule, therefore, was distinctly unfavorable from an output standpoint. The detailed table in the appendix, however, shows that in the majority of instances the reduction in hours was accomplished by the introduction of a Saturday half-holiday, which, at least for some time, would naturally have an adverse effect on production. Again, most of the reductions made by establishments in this group occurred in 1917. Experience with such a schedule has, therefore, been brief, while the abnormal conditions incident to the war may have had an influence on the results. There is no evidence that output depended directly on changes in wages. In fact, three companies reporting that output was maintained did not change the rates for pieceworkers, who usually constitute the majority of the factory force.

The qualifying factors just mentioned make it difficult to arrive at satisfactory conclusions; nevertheless, on the basis of such experience as is available, it is reasonably clear that under present conditions a 50-hour week will not maintain production at a maximum in the boot and shoe industry.

COMPARISONS OF OUTPUT WITH A 50-HOUR SCHEDULE

Comparative statistics of output secured from three establishments in the 50-hour group tend to confirm the conclusions suggested by the preceding analysis of statements of manufacturers. In one instance where the reduction in hours was effected by distributing it over the week, output was reduced approximately 3% as compared with a reduction of $8\frac{1}{3}\%$ in time; while, in the other two cases where the time was shortened by the elimination of Saturday afternoon work, there was a decrease about proportional to the reduction in hours.

The first establishment was the Alfred Kimball Shoe Company, at South Lawrence, Mass., employing 375 operatives. The reduction in hours was from 54 to $49\frac{1}{2}$ per week, effective on January 1, 1917.

The following table summarizes the output results for a period of about two months at the close of 1916 under a 54-hour schedule and for approximately three months immediately following, in 1917, under a 49½-hour schedule.

TABLE 8: COMPARISON OF OUTPUT PER EMPLOYEE UNDER A 54-HOUR SCHEDULE AND UNDER A 49½-HOUR SCHEDULE IN A PLANT WHERE REDUCTION IN HOURS WAS EFFECTED BY SHORTENING EACH WORKDAY.

(National Industrial Conference Board)

	Average number of operatives per week		Average number of pairs per operative per week		Per cent of decrease or increase
	54 hours a week	49½ hours a week	54 hours a week	49½ hours a week	
Upper cutting	40	38	463	430	Dec. 7.3
Sole cutting	19	19	947	865	Dec. 8.6
Stitching	102	104	167	167	
Stock fitting	26	26	667	620	Dec. 7.0
Lasting	51	49	337	337	
Making	48	48	354	346	Dec. 2.4
Finishing	26	24	683	694	Inc. 1.6
Packing	43	45	390	370	Dec. 5.2

From this table it appears that in the stitching and lasting departments output was fully maintained, and that in the finishing department there was a slight increase. In the making department there was a decrease, but very much less than proportional to the reduction in hours. In the cutting departments and in the packing department, however, there was a substantial decrease in output.

The results, as a whole, indicate a marked increase in hourly efficiency and that a 50-hour week did not involve a serious loss in total production.

One of the other establishments was the W. L. Douglas Shoe Company, of Brockton, Mass., employing about 3,000 operatives. The reduction in hours, from 54 to 50 per week, made on May 1, 1917, was effected by cutting off Saturday afternoon work. The loss in output for the factory as a whole was almost exactly proportional to the reduction in hours. There was, however, a considerable variation in the percentage loss among the different de-

partments. This is brought out by the following table, which gives average results for eight weeks in February and March, 1917 (omitting the last week of February because of the holiday), under a 54-hour schedule, and for four weeks of May of that year under a 50-hour schedule. During the following months under a 50-hour schedule the factory hours were so badly interrupted because of stock-taking (the nominal hours in several weeks being less than thirty) that the results could not fairly be used in comparison with those for the longer week.

TABLE 9: COMPARATIVE OUTPUT OF A LARGE BOOT AND SHOE ESTABLISHMENT UNDER A 54-HOUR SCHEDULE AND UNDER A 50-HOUR SCHEDULE, BY DEPARTMENTS.

(National Industrial Conference Board)

Departments	Average number of operatives per week		Average number of pairs for each operative per week ^a		Per cent decrease in output per operative per week
	54 hours	50 hours	54 hours	50 hours	
Upper cutting	471	475	143.1	131.2	8.3
Sole cutting	300	297	224.8	210.2	6.5
Stitching	673	684	102.2	89.2	12.8
Gang room	913	959	72.4	64.9	10.4
Finishing	224	227	294.0	275.1	6.4
Packing	284	289	231.6	213.9	7.6

^aIt should be noted that the number of pairs of shoes per operative represents the number worked on in each department and not the number completed for the entire factory force.

In some departments the reduction in output was more than proportional to the reduction in time. This indicates that other factors than the change in factory schedules were in operation.

The following comparison gives the product per operative per hour under the two schedules by departments. Except in the stitching room and the gang room the hourly output was about the same under the two schedules. An equal output per hour under the two schedules means, of course, a loss in total output proportional to the reduction in weekly hours.

Without detailed information of all collateral conditions, it would be unsafe to use the figures as a definite indication of the effect of the reduction in hours alone. The evidence, however, clearly indicates that the reduction in hours of work in this establishment was accompanied by a marked loss in total output.

PRODUCT PER OPERATIVE PER HOUR		
	54-hour week	50-hour week
Upper cutting	2.65	2.62
Sole cutting	4.16	4.20
Stitching	1.89	1.78
Gang room	1.34	1.30
Finishing	5.44	5.50
Packing	4.29	4.28

The third establishment was the George E. Keith Company, of Campello, Mass., in the Brockton district, which operates several factories located considerable distances apart. Hours of work were reduced from 54 to 50 per week on May 1, 1917, by the elimination of Saturday afternoon work.

Statistics were secured from four factories of this establishment, and in every case it was found that total output was reduced. In one factory there was a decided loss of hourly output for the 50-hour schedule as compared with the 54-hour schedule. The loss in total output was therefore proportionately greater than the loss in time, indicating that some factor other than the change in hours was involved. A possible explanation is that under the 50-hour schedule the factory was not running with a full complement of workers. It is the general opinion of employers that maximum efficiency is more easily attained when a factory is run at full capacity than when it is run slack.¹ In the other three factories, which varied considerably in size, the reduction in output was approximately proportional to the reduction in hours. Nominal hours in these factories were, however, extremely irregular because of slack work, stock-taking, and other causes.² For this reason, definite conclusions are not

¹See National Industrial Conference Board Research Report No. 4. "Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing," page 32.

²An idea of this irregularity of nominal hours may be had by reference to page 16, which covers the factories in question.

warranted. The results are, nevertheless, of interest as indicating that even with many short weeks there was no apparent increase in hourly efficiency of the workers.

These statistics for only three establishments are not presented as a basis for conclusions as to the merits of a 50-hour schedule, but merely as supplemental evidence to be considered in connection with the statements of manufacturers above discussed. Taking all the experience of a 50-hour week into consideration, it is clear that while such a schedule may be practicable in some instances it has not maintained output in the boot and shoe industry generally.

THE 52-52½-HOUR GROUP

This group includes 13 establishments, of which 6 had reduced to a 52-hour week and 7 to a 52½-hour week. Again, because the difference is only one-half hour per week, it is advisable to discuss the group as a whole. A summary follows:

TABLE IO: NUMBER AND PER CENT OF ESTABLISHMENTS, AND OF EMPLOYEES, WHICH REDUCED HOURS TO 52 OR 52½ PER WEEK, AND THE PREVIOUS SCHEDULE HOURS, GROUPED ACCORDING TO EFFECT ON OUTPUT.

(National Industrial Conference Board)

Effect on output	Previous hours ^a	Establishments		Employees	
		Number	Per cent	Number	Per cent
<u>Total</u>		<u>13</u>	<u>100.0</u>	<u>11,353</u>	<u>100.0</u>
Maintained . . .	{ 57½ (1) 55 (5) 54 (1)	7	53.8	9,140	80.5
Decreased . . .	{ 60 (1) 55 (3) 54 (2)	6	46.2	2,213	19.5

^aFigures in parentheses represent the number of establishments.

The experience of this group is in sharp contrast with that of the 49½-50-hour group. Of the 13 establishments included, 7, or 53.8%, employing 9,140 workers, or more than 80% of the total number, reported that production was maintained.

EXPERIENCE OF THE W. H. McELWAIN COMPANY

Two of the 7 establishments were unusually large, employing nearly 7,500 workers. One of these was the W. H. McElwain Company, which not only maintains an unusually large planning staff, but which also devotes an exceptional amount of attention to management problems.

The seven shoe factories of this company reduced hours from 55 to 52 per week in December, 1916.¹ A comparison of the output for a two-months period just prior to the reduction, with that for a four-months period immediately following it, is given in the following table:

TABLE II: COMPARISON OF OUTPUT FOR A TWO-MONTHS PERIOD UNDER A 55-SCHEDULE, WITH A FOUR-MONTHS PERIOD UNDER A 52-HOUR SCHEDULE.

Hours per week	Date	Days worked	Number of Employees	Productive unit per day based on pairs shipped	Rate of production per operative
55	Oct., 1916	23.0	3964	8.93	100.0
55	Nov., 1916	22.95	4007	8.90	
52	Dec., 1916	22.5	4087	9.22	101.0
52	Jan., 1917	24.0	4122	8.78	
52	Feb., 1917	20.73	4150	8.89	101.3
52	March, 1917	24.38	4189	9.11	

Production under the 52-hour schedule, therefore, was not only fully equal to but slightly greater than that obtained under the 55-hour schedule. The daily productive unit per employee rose from 8.91 under the longer schedule to 9.00 for the first two months under the shorter schedule and to 9.02 for the succeeding two months,—an increase of 1.3%. It should be noted that these comparisons represent averages for 7 factories. In two of the 7 factories it was found necessary to reduce the standard “sheet” production² somewhat when hours were shortened. In another, standard production was at first reduced but later restored. In two factories,

¹In the upper leather factory at Boston, the schedule was 50 hours; now 48 hours.

²See footnote, page 8.

standard production was increased and in two was left unchanged. The changes made in such standard production are indicated by the foot-note table.¹

The company stated that conditions were such as to furnish excellent basis for comparing results under the two different hours-of-work schedules:

- 1. Production had been built up to what was regarded as approximately a maximum, each plant having reached a production in excess of any previous period;
- 2. Each plant was laid out with the maximum number of machines in the space available;
- 3. There was an employee on practically every machine in the system;
- 4. Over 95% of the productive payroll was on standardized piecework;
- 5. All of the plants were running smoothly under a routing system, in which delays due to lack of material were practically zero;
- 6. No new factories were in process of organization;
- 7. No material changes were being made in the character of the product;
- 8. No machinery or processes tending to increase per capita output materially were being installed; the few changes being made would tend to slightly increase the productive difficulty;
- 9. Standard production load was such that going out early was almost unknown; here and there a few special departments were occasionally working overtime.

¹ STANDARD PRODUCTION				
Date	Factory Symbol	Production from	Changed to	Reason
Dec., 1916	MN	238	250	Increased production.
	MP	175	175	No change.
	MT	108	108	No change.
Feb., 1917	MD	288	275	To offset increased production on a more difficult product.
March, 1917	MC	212	200	To offset increased production on a more difficult product.
March, 1917	ME	288	275	To facilitate improvement of product.
March, 1917	ML	250	262	Factory gaining in actual production.
April, 1917	MC	200	212	Former production resumed.

The results were regarded as satisfactory and in January, 1918, the company made a further reduction of the nominal schedule to 50 hours per week. Since at this time the shortage of coal resulted in the Monday "shut-downs," and since in some of their factories there was considerable change in the style of shoes manufactured, particularly in the proportion between army and civilian shoes, and since also there was a considerable change in the working force, due to war employment conditions, it was impracticable to present statistical data which could be used to compare results under the 50-hour schedule with those under the 52-hour schedule. It was stated, however, that no significant decrease in output had been detected.

In considering the experience of this company, it is important to note a few rather exceptional conditions.

First, the company devotes unusual attention to management problems and has an especially large force of experts on its planning staff. Second, the proportion of pieceworkers on the "productive" payroll is exceptionally high,—95%, as compared with an average of about 68% for all companies covered by this investigation. However, this proportion of pieceworkers had been a feature of the organization under the longer schedule as well. Third, the company manufactures a medium grade of boys' and men's shoes, on which it may be more practicable to speed up production than on those of higher grade. Fourth, pieceworkers observed practically the full nominal hours; "going out early was almost unknown."

While, therefore, the introduction of a 52-hour schedule by this establishment was accompanied by full maintenance of output, and, indeed, by a small increase, the distinctive features of its organization as above noted are so important that it does not necessarily follow that the results obtained would be, or even could be, secured in the ordinary boot and shoe establishment. Nevertheless, the experience of this company is exceedingly significant.

A representative of the company stated that the increase in output under the 52-hour schedule was not due to better organization, as methods of management were practically identical under both schedules. The principal explanation of the maintenance of output under the shorter schedule was that there had been a considerable reduction

of lost time "between jobs," that is, an improvement in the continuity of work.

A representative of this company in discussing the results secured with shortened hours at its plants, said:

In discussing the relation of hours of work to output a distinction should be made between what may be termed factory production, — that is, the immediate output of the factory when hours of work are changed, — and what may be termed social production. With respect to factory production, the immediate effect of a shortening of hours, especially if the reduction is not made gradually, may be a curtailment of output, although by no means necessarily so.

The factors controlling output are, however, so numerous that unless collateral conditions are unusually favorable it is difficult to judge the effect of changes in hours on factory production from a brief experience. It happened that when we reduced our hours from 55 to 52 per week these collateral conditions were exceptionally favorable, so that a direct comparison could be made between hours of work and output. In our recent reduction from 52 to 50 hours, however, the unsettling influence of heatless Mondays, of changes in the proportion of women workers, and shifting in the character and style of the product, do not permit of comparisons from which sound conclusions can be drawn for the limited period that the 50-hour schedule has been in effect.

Even from the narrower standpoint of factory production, I am satisfied that if hours of work are reduced gradually, it is possible for any well conducted boot and shoe establishment to secure maximum production in 50 or even 48 hours per week, while, from the standpoint of social or community production, a somewhat shorter week may eventually be justified.

Future development of pre-planned and systematized part-time employment for a considerable percentage of the workers is of tremendous importance. Both factory production and social production undoubtedly can be increased materially through the scientific and intelligent development of part-time

employment. Future research in part-time employment methods may entirely upset the point of view from which we now approach the hours-of-labor problem. This applies particularly to women.

OTHER EXPERIENCE WITH A 52 or 52½-HOUR SCHEDULE

The other large establishment in the 52-52½-hour group which reported that production was maintained made the following statement:

The principal reason why we were able to maintain our production at no increased cost under a shortened schedule of hours was that 85% or 90% of our pieceworkers had not been working the full 55 hours, and when we changed to 52½ hours we insisted on a large majority of them working the full time where it was possible.

In this way we got many pieceworkers to increase their hours from 48 to 50 or 52.

This increase in the number of hours worked by pieceworkers offsets any loss in production of our day hands.

In this case, therefore, maintenance of output was a direct result of an increase in the number of hours of actual work and not a response to diminished fatigue as a result of a shorter workday. The proportion of pieceworkers in this establishment was unusually high, about 85% of the total force; this may have had considerable influence on results.¹

Of the other establishments in the group of 7 which maintained production, two were of moderate size; three were very small, one of them employing only eighty persons, the others, thirty-three and thirty, respectively.

The experience of this group indicates definitely, therefore, that exceptionally large and well-managed establishments can maintain production with a work schedule

¹See page 43.

of 52 hours per week. It also suggests that in very small factories where the proprietor is in close touch with his workers, output may be maintained with such a schedule.

The accomplishment of these results in certain plants raises the question whether similar success cannot be obtained in others. The qualifying factors in the case of certain establishments in this group are so important that it cannot be asserted that the results obtained by them conclusively demonstrate the feasibility of a 52-hour schedule for the industry in general. Nevertheless, the fact that a majority of the companies embraced in this group reported that production was maintained, and the further fact that several establishments operating on a 50-hour schedule likewise reported that they were able to maintain production, create a strong presumption that, if the management is efficient and if collateral conditions are normal, a work-week of 52 hours is practicable for a considerable proportion of establishments in the industry.

Before deciding, however, whether a 52-hour week is desirable, it is necessary to know whether the intensity of work with such hours was so much greater than under a longer week that the workers derived no benefit, or even suffered from the change. Comment was made by some employers as to high pressure of work in establishments operating under a 52-hour weekly schedule. In one instance, at least, it was contended that plants working somewhat longer hours could easily entice workers from those in the 52-hour group. There is some evidence that the strain of the work in establishments in the 52-hour group is rather severe. To secure conclusive information on this point would require an intensive study covering a considerable time and a large number of workers.

THE 54-HOUR GROUP

Of 19 establishments reporting the results of reduction to a 54-hour schedule, 6, or 31.6%, stated that output was maintained; 13, that it was reduced. The 6 maintaining production employed 54.2% of the total number of workers in the group. A summary comparison follows:

TABLE 12: NUMBER AND PER CENT OF ESTABLISHMENTS,
AND OF EMPLOYEES, WHICH REDUCED HOURS TO 54
PER WEEK, AND THE PREVIOUS SCHEDULE HOURS,
GROUPED ACCORDING TO EFFECT ON OUTPUT.

(National Industrial Conference Board)

Effect on output	Previous hours ^a	Establishments		Employees	
		Number	Per cent	Number	Per cent
<u>Total</u>		<u>19</u>	<u>100.0</u>	<u>10,895</u>	<u>100.0</u>
Maintained . . .	<div> <div>{</div> <div>60 (2)</div> <div>58 (3)</div> <div>— (1)</div> </div>	6	31.6	5,904	54.2
Decreased . . .	<div> <div>{</div> <div>60 (5)</div> <div>59 (2)</div> <div>58½ (1)</div> <div>58 (3)</div> <div>57 (1)</div> <div>— (1)</div> </div>	13	68.4	4,991	45.8

^aFigures in parentheses represent the number of establishments.

Two of the 6 establishments in the 54-hour group maintaining production were unusually large, one having over 1,000 employees, and the other over 4,000; the other 4 were of average size. Two establishments in the group of 13 reporting that production decreased were also rather large, one having about 1,200 employees, the other about 1,650. The remaining 11 varied widely in size.

While more than two-thirds of the establishments in this group reported that production was decreased with a 54-hour schedule, the fact that nearly one-third of them were able to maintain output is significant, and indicates — particularly in view of the results for the 52-52½-hour group — that a 54-hour week is a practicable one for the industry. This conclusion gains point from the detailed evidence for this group in the appendix table, which shows that of the 13 establishments reporting that output was decreased, 11 effected the reduction in hours by means of the Saturday half-holiday, while, on the other hand, of the 6 establishments which maintained output, 4 distributed the reduction in hours over the week. In view of what has already been said as to the effect of an abrupt discontinuance of Saturday afternoon work, it

seems certain that this summary understates the practicality of maintaining output with a 54-hour week.¹

The appendix table indicates that changes in wages did not have an important bearing on results, as the total wages in most cases remained unchanged in establishments which maintained output as well as in those which did not. In the establishments maintaining output, about 70% of the operatives were pieceworkers, while in those reporting a decrease, pieceworkers constituted about 66% of the working force. It would be unsafe to use this as proof of the greater efficiency of the piecework system. Evidence given elsewhere, however, shows conclusively that the piece-rate system is more conducive to maximum production than the daywork system, at least so far as immediate results are concerned.²

Rather general satisfaction with a 54-hour week was expressed by employers interviewed in the course of investigation. For instance, one employer stated:

We do not believe that an operator can accomplish as much in 48 hours per week as in 54, but we do feel that he can accomplish as much in 54 as in 60. Owing to the strain of a 60-hour week, and under the piecework system, such as is common in the shoe industry, an operator will work harder and therefore produce more per hour in a 50 to 54-hour week than in a 60-hour and therefore undoubtedly earn as much.

The head of another large establishment which had reduced nominal hours from 60 to 54 per week said:

The reduction in hours was undoubtedly appreciated by the employees. Application and industry, and, probably in slight degree, attendance improved. We believe such reduction to be in keeping with the movement and spirit of the times, and believe we could obtain very nearly, if not entirely, the same output in 9 hours as in 10. It is doubtful whether the production was reduced to any perceptible degree by the change in hours.

Similar statements were made by several other manufacturers operating on a 54-hour schedule.

Altogether, therefore, experience with a 54-hour week affords strong evidence that maximum production can be maintained with such a weekly schedule.

¹See page 23.

²See pages 43 and 44.

THE 55-HOUR GROUP

Of 8 establishments in the 55-hour group reporting the results of reductions in hours on output, 3 stated that it had been maintained; 5, that it was decreased. The three which maintained production, however, were very small, employing only 17.5% of the employees in the group, as against 54.2% for the establishments maintaining production in the 54-hour group. A summary comparison follows:

TABLE 13: NUMBER AND PER CENT OF ESTABLISHMENTS, AND OF EMPLOYEES, WHICH REDUCED HOURS TO 55 PER WEEK, AND THE PREVIOUS SCHEDULE HOURS, GROUPED ACCORDING TO EFFECT ON OUTPUT.

(National Industrial Conference Board)

Effect on output	Previous hours ^a	Establishments		Employees	
		Number	Per cent	Number	Per cent
<i>Total</i>		<u>8</u>	<u>100.0</u>	<u>3,514</u>	<u>100.0</u>
Maintained . . .	{ 60 (2) — (1)	3	37.5	615	17.5
Decreased . . .	{ 59 (3) 58 (2)	5	62.5	2,899	82.5

^aFigures in parentheses represent the number of establishments.

Results were broadly similar to those for a 54-hour week, which is perhaps natural in view of the fact that the difference of only one hour per week is but about ten minutes per day. However, in view of the results obtained with a shorter week by other establishments, the fact that a decrease was reported by a majority of establishments in the 55-hour group is surprising. The reason is not clear. It may be that local conditions, the character of the product, or the efficiency of the management largely controlled results for the 55-hour group. An intensive study of such details was not made, since the fact that many establishments were able to maintain production with the shorter week makes it reasonably clear that, if operating conditions are properly adjusted, the ordinary establishment in the boot and shoe industry should easily be able to maintain output on a 55-hour schedule.

FACTORS BEARING ON EFFICIENCY

Certain broad factors appear to have an important bearing on the results disclosed by the preceding discussion.

1. The size of the establishment has a considerable though not a controlling influence on ability to maintain output when hours of work are reduced. Thus, the appendix table shows that of 10 establishments employing less than one hundred workers each, 7 maintained output when hours were shortened, and that of 13 employing more than one thousand workers each, 6 reported production as maintained; while of 54 establishments employing from one hundred to one thousand workers each, only 11 reported that they were able to maintain production on the shorter schedules.

These figures by themselves should not be used as a basis for conclusions, but they suggest that the very large and the very small establishments were better able to maintain output than those of moderate size. One reasonable explanation of this is that the very large establishments maintain expensive and efficient management staffs, while in the very small ones the opportunity for personal contact may have encouraged efficiency.

However, the number of hours worked undoubtedly had a much more important bearing on results than the size of the establishment. Thus, of 13 companies each employing from 500 to 1,000 workers, all reported a loss in production. The appendix table shows that 12 of the 13 had reduced to 50 hours per week.

2. The piecework system is more conducive to maximum output in the boot and shoe industry than the day-work system. The appendix table contains several references to the effect that output was maintained by pieceworkers when hours of work were shortened. The following are representative statements:

No change in output or labor costs for piecework.

Same output for piecework.

There is no apparent reduction in piecework operations.

No change for piecework.

No noticeable change in output or costs for piecework.

Very slight decrease on the part of pieceworkers.

While reported instances of this sort were not numerous, there was general agreement among manufacturers interviewed on this point that the piecework system was more efficient than daywork.

The employment manager of one large establishment said:

The piece-rate system, if properly administered, is conducive to efficiency. A high proportion of pieceworkers is, indeed, an indication of efficient management. The task of adjusting production to a large force on a piece rate basis is so great as to make good management imperative. Where pieceworkers constitute over 70% of the total force and the business is running smoothly, there is *prima facie* evidence of good management.

Our experience has been that not only from the company viewpoint, but also from the operator's viewpoint, the piecework method of payment is much more satisfactory to all parties concerned, and it is the policy of the company to extend the piecework plan wherever conditions are such that this can be worked out satisfactorily for both the interests of the operators and the concern.

It should be noted, however, that a union official held that the piecework system was objectionable on the ground that it was conducive to overspeeding.

3. Maintenance of output with shorter hours-of-work schedules was not dependent on changes in wages. In fact, a majority of the reported wage increases occurred in those establishments where production decreased. This does not, however, necessarily indicate that the amount of wages — as distinct from changes in rates of wages — had no influence on results, since, if wages were higher or adjusted on a more scientific basis in establishments maintaining production, this might easily have had an important effect on output. No attempt has thus far been made to secure evidence on this point, since the determination of average rates of wages for a large number of establishments would require more time than it has so far been practicable to give.

4. The method by which the reduction in hours was effected had an important bearing upon results. Of the 77 establishments reporting the effect on output of reductions in hours, 50 shortened the work-week by granting a Saturday afternoon holiday, while 27 distributed the reduction in hours over the other days of the week. A comparison of results follows:

TABLE 14: RESULTS ACCOMPANYING REDUCTION IN HOURS OF WORK ACCORDING TO THE METHOD BY WHICH REDUCTION WAS EFFECTED.

Method of Reduction	Establishments			Percentages	
	Total	Maintained	Decreased	Maintained	Decreased
Distributed through week .	27	15	12	55.6	44.4
By Saturday half-holiday .	50	9	41	18.0	82.0

From this table it appears that of the 27 establishments which distributed the reduction in hours through the week, 15 maintained production and 12 experienced a decrease; whereas, of the 50 establishments which adopted a Saturday half-holiday, only 9 maintained production. That the method of reducing hours has a vitally important effect upon results is, therefore, reasonably certain. The results should, however, be studied in connection with the schedules of hours to which they apply.¹

EFFECT OF IRREGULAR ATTENDANCE OF PIECEWORKERS

Reference has already been made to the irregular attendance of pieceworkers in many shoe establishments.

¹The results by hour groups were as follows:

Present hours	Distributed through the week		By Saturday half-holiday	
	Maintained	Decreased	Maintained	Decreased
48	0	1	1	0
49½ and 50	3	4	2	24
52 and 52½	5	5	2	1
53	1	0	0	0
54	4	2	2	11
55	0	0	3	5
56	0	0	1	0

It was shown, moreover, in the case of one establishment in the 52-hour group that the *actual* hours of pieceworkers were increased when nominal hours were shortened. In some other cases the actual hours of pieceworkers remained about the same under the shorter nominal schedule as under the longer one; this, of course, has a very important bearing on conclusions. Thus, if a majority of the workers in an establishment reducing nominal hours from 54 to 50 per week actually worked 46 hours under both schedules, the statement that they maintained their output simply amounts to saying that they turned out the same quantity of work in the same number of hours. Such comparisons do not give any reliable index to the point at which maximum production would be maintained; this might have been secured with 48, 50, or 52 hours of actual work.

In drawing accurate conclusions for individual establishments, therefore, it becomes of vital importance to know the actual hours of work as well as the nominal or factory schedule hours. If an attempt were being made to arrive at quantitative measurements of the difference in output under different hours-of-work schedules, this irregularity of pieceworkers' attendance would have to be allowed for in all cases. As a matter of fact, it is practically impossible to do this with accuracy. Although special effort was made to obtain definitely the number of hours worked by pieceworkers, in most cases the information could not be secured. Often no records of pieceworkers' hours are kept and information as to their average hours could at best be only approximated by employers; approximations made as to the average hours of work several years ago obviously might be extremely misleading.

Such precise measurement is not essential for the broad conclusions set forth in this report. Clear discrimination must, however, be made between the maintenance of production as a result of more efficient management or as a result of an increase in actual hours of pieceworkers, and the maintenance of production as a natural or involuntary response of workers to diminished fatigue in consequence of shorter hours.

REASONS FOR IRREGULAR ATTENDANCE OF PIECEWORKERS

One reason for the irregular attendance of pieceworkers is found in factory operating conditions. The close inter-

relationship of processes requires a constant flow of work through every department in the factory. This, however, is not always secured. At times the failure may be due to inefficient management; at other times, to unavoidable delays; still again, to slack work. Under such conditions it frequently happens that pieceworkers in some departments complete all the work provided for them before the closing hour and leave the factory solely because there is nothing more for them to do. It is a more or less common practice in some factories to apportion the day's work among the various employees so that each has a given quota. The more rapid workers finish their allotment early and quit before the closing hour.

Obviously, the management should attempt to adjust the factory force to the work and also to arrange the work so that the more rapid workers will have a larger allotment than the slower ones. As a matter of fact, however, the management in some establishments does not attain a reasonable maximum of efficiency.¹ At other times the demand for shoes is not sufficient to keep the factory running full. In such cases early quitting of pieceworkers is the fault of the establishment or of conditions rather than of the worker.

A representative of one large company in discussing this subject said:

This practice of pieceworkers in its ultimate analysis goes back to the management. The failure of managers long ago properly to adjust the working force to production led to a great deal of lost time. The workers sought to offset this by getting higher piece rates; they thus got into habits of short and irregular hours, and now do not realize their moral responsibility to change them. A disposition on the part of many workers to be content with a given

¹ In this connection it may be noted that Mr. Henry B. Endicott, when handing down his decision February, 1918, as referee in the dispute in the Lynn shoe industry, said in part:

On all the evidence (as to much of which there is no dispute) it is clear that the Lynn shoe trade, generally speaking, has fallen into a demoralized and unfortunate condition, bad alike for the employer and the employee.

The work of the various factories is not graded. It should be.

The work in many of the factories is unsteady, with times of "rush" and too frequent times of "lay-off" and "slack work." This is bad for all concerned.

total weekly earnings is also an important factor. Time lost by pieceworkers from this particular cause occurs most frequently in the less efficient factories and largely in union districts. Companies maintaining expensive staffs for scientific management would not be likely to incur any large loss of time from this source.

In some cases, however, the evidence indicated that irregularity of pieceworkers' attendance was largely due to their own disinclination to work longer hours. In some cases pieceworkers were apparently content to earn a certain self-determined weekly sum, and when this total was assured for the week they began to ease up. How far this attitude is responsible for the irregularity of attendance reported it is impossible to say.

EFFECT OF TRADE UNION RESTRICTIONS

Another reason sometimes given for irregularity of pieceworkers' attendance was the direct or indirect influence of trade union limitation of weekly earnings of union members. It may be significant in this connection that complaints of irregular attendance by pieceworkers were much more numerous in highly unionized districts like Brockton and Lynn, Massachusetts, than in non-union districts like those in Maine and New Hampshire.

Many manufacturers were positive in their assertions that arbitrary restrictions on output were imposed by trade unions. The following statements are more or less typical of those made to field investigators:

The union practically restricts the output.

Pieceworkers work their 8 hours per day, the output being controlled by union regulations.

Pieceworkers usually finish their work by three or four o'clock in the afternoon. This is not entirely due to the limitation placed on their production by the unions, but it is largely so.

Output is restricted by union regulations.

Unions are strong and restrict output; they seem to dominate Brockton factories.

Pieceworkers' output is so restricted by union regulations that good pieceworkers rarely work more than 40 hours per week and perhaps the average pieceworker does not work more than 44 or 46 hours.

Everything here is practically regulated by union labor, which practically dictates what the daily output is to be in each factory. There is no question in our minds that a great many more pairs per day could be turned out by the same force in the same number of hours if the workers were permitted to do so.

These statements are presented as opinions, not as demonstrated facts, and they are offered merely as an indication that in some establishments trade union regulations may have been a factor in restricting output.

Mr. John F. Tobin, President of the Boot and Shoe Workers' Union, was asked for an expression of his views on this subject. He said:

The blanket charge that is sometimes lodged against shoe workers of limitation of production does not seem to me to be well placed for two principal reasons, either one of which would appear to sufficiently refute the charge.

In the first place, shoe workers are almost exclusively employed by the piece and the incentive is to increase production from the mistaken idea that they increase their earnings. While this might be true temporarily, in the long run it has the opposite effect of intensifying labor and lessening the price per operation.

The other important reason which disproves the charge of limitation of production is that the output of the factory is determined by the employer in his office and the employees must content themselves with their proportionate allotment of the aggregate production determined by the employer. Hence, speedy operatives, or even those of ordinary capacity, may finish their day's work in five, six, or seven hours and find themselves with nothing else to do for the day because the sheet, so called, has been completed and there is no further opportunity for labor until the following day.

To determine the merits of so controversial a matter would require most careful investigation among manufacturers, trade union officers, and workers. Such an investigation should also cover the subject of cutting of piece rates by employers, a practice often held responsible, in part, for arbitrary restrictions on output. For the purposes of this report, such a study is not necessary.

In any case, because of the subtle and intangible character of restriction, and because of the inconstancy of its practice, the effect of its influence cannot be accurately measured. If enforced under a 56 or a 58-hour week, it does not follow that it will be enforced (or practised) to the same extent or on a pro rata basis under a 52 or a 54-hour week; on the other hand, it may be as marked under a 50-hour week as under one of greater length.

CONCLUSIONS AS TO OUTPUT

Despite the numerous complicating features entering into the problem, these conclusions appear to be clearly warranted:

First: A 54-hour week is long enough to maintain production at a practical maximum in the boot and shoe industry as a whole, even under present work conditions. It must be recognized that under any hours-of-work schedule, results will vary widely among different establishments. The best located, the best equipped, and the most efficiently managed plants will achieve a rate of production which cannot be secured in all others. If, however, a given schedule of hours is shown to be long enough to attain maximum results in a substantial proportion of establishments in the industry, the fact that others cannot do as well does not constitute a valid objection to such a schedule.

Second: Several well-equipped and well-managed establishments have obtained as large an output from a 52-hour or a 52½-hour week as from a longer one. Such results, moreover, apparently would be obtainable in many establishments provided high efficiency standards were maintained.

Third: While a 50-hour week may be feasible for a limited number of establishments, the weight of experience with such a schedule was so unfavorable as to indicate clearly that under present conditions it is not an economic work-week for the industry as a whole. However, the evidence in this report shows that, in many boot and shoe establishments, routing of work is at times not efficiently arranged; that nominal hours frequently are highly irregular; that pieceworkers, either because of such inefficient routing or from choice, often work unusually short hours; and that output in some factories has been arbitrarily restricted. There is, therefore, an opportunity

for a marked increase in efficiency of operation in the industry. If all such hindrances to production could be eliminated, and a genuine spirit of co-operation secured between employer and employee, it is possible that a 50-hour week would be as productive as a longer schedule. On the basis of actual experience, however, there is no escape from the conclusion that the general introduction of a 50-hour week in the industry at the present time would involve a significant decrease in output.

On account of the increased intensity of work there is some question whether the worker is really benefited by a 50 or even a 52-hour schedule as compared with a 54-hour week. This is a matter on which a reliable opinion cannot be rendered without extensive investigation.

Fourth: A 48-hour week in the boot and shoe industry will not maintain production at a maximum under present conditions nor without radical changes in operating methods. The evidence on this point, although based on experience of but a few concerns, is convincing.

It should be repeated that the conclusions here stated relate to what has been termed factory production and do not take account of the question as to whether a work-week which will not maintain such factory production at a maximum, at least for the time being, may nevertheless be justifiable on broad social grounds. This is a matter which will largely be decided by opinion rather than by statistical evidence and one on which judgment is not expressed in this report.

It should be further kept in mind that the tabular comparisons as to changes in output presented in this report are of a general character; since, in many cases, other influences than the reduction in hours were in operation, results should not be too rigidly interpreted. To test results by statistical analysis of output records for every establishment would be out of the question even if records were always available, which is not the case. Nevertheless, the collective experience of so large a group of establishments as is included in this study forms a valid basis for conclusions of the broad character here set forth.

The results differ sharply from those presented in the report on experience with different hours-of-work

schedules in the cotton industry,¹ which showed that in only an insignificant percentage of establishments was it possible to maintain maximum output with a 54-hour nominal schedule. The controlling reason for this difference in results appears to be the difference in the nature of the work. A very large part of the work in a cotton mill is of a machine-time character, which does not permit the worker, either through an unconscious response to a shorter day or by conscious effort, to overcome the loss in machine-time production when the work-week is shortened. In a boot and shoe factory, on the other hand, notwithstanding the remarkable development of machinery, the element of hand-time work is extremely important and constantly present. Apparently it is the importance of this hand-time feature of the work, more than anything else, which permits of the maintenance of production in the boot and shoe industry when the work-week is shortened to 54 hours, or even to a somewhat shorter schedule.

¹See National Industrial Conference Board Research Report No. 4. "Hours of Work as Related to Output and Health of Workers—Cotton Manufacturing."

HOURS AND HEALTH OF BOOT AND SHOE WORKERS

The preceding discussion has been chiefly concerned with output. In arriving at conclusions as to the proper length of the workday, the factor of health must also be considered.

Of 45 establishments reporting on health conditions, 26 stated that shortening of hours of work had had no significant effect on the health of workers; only 4 establishments definitely reported an improvement. In all of these 4 instances the reduction in hours was from a 58-hour or a longer week to 56, 55, or 54 hours, whereas the relative merits of a 54-hour week and of a shorter week are of more practical importance. The experience of these 4 establishments, therefore, while interesting, does not aid materially in arriving at conclusions as to the health factor in the hours-of-work problem. Many of the companies reporting that no change in health conditions was apparent were operating on a 50 or a 52-hour schedule.

In the absence of a recognized standard of measurement, however, such opinions are not a sufficient basis for conclusions.

With respect to factory conditions, a report issued by the Massachusetts State Board of Health in 1907, "The Sanitary Condition of Factories, Workshops, Etc.," stated that 220 establishments visited showed "fair general conditions"; in 72, conditions were poor; and in 19, distinctly bad. It must be borne in mind that this investigation took place a decade ago. The report noted that in those establishments classed as generally fair, some portions of the plant were in good condition.

A later report of the same Board, "Hygiene of the Boot and Shoe Industry in Massachusetts," published in 1912, gave the following summary as to light, ventilation, and sanitation:

CONDITIONS IN 483 FACTORIES, AS TO LIGHT, VENTILATION, AND WATER-CLOSETS			
	Light	Ventilation	Water- Closets
Excellent	30	7	6
Good	441	468	415
Moderately bad	2	3	7
Distinctly bad	10	5	55
	483	483	483

It would seem, therefore, that in Massachusetts, which includes almost half of the boot and shoe factories of the United States, general factory conditions had improved since 1907, until, in 1912, they were, on the whole, favorable.

A similarly favorable report on factory conditions in Ohio was made by the U. S. Public Health Service, which stated in a report¹ covering several large establishments:

Among all the factories visited, the location of the factory with regard to surrounding buildings was excellent. There was an abundance of light and shaded electric bulbs were provided for use on dark days, especially for the girls working on sewing machines. The air in the workrooms in no place was foul or excessively vitiated with the exhalations from the lungs or the bodies of the workers, but in most instances it was somewhat too dry and warm.

In shoe factories good light is one of the essentials to good work, and it is the general practice to place the machines alongside the windows. If, however, machines are placed so that the operatives face the windows, with the light shining in their faces, the effect on the eyes is likely to be injurious. An inquiry into the conditions affecting health of operatives in certain shoe factories in New Jersey² indicated that operatives so placed were constantly troubled with pain in the eyes, which toward the end of the day's work became acute.

GENERAL HEALTH OF BOOT AND SHOE WORKERS

When endeavoring to measure health hazards in any specific industry, a statistical record of the extent of illness among workers would be of much greater value than mortality data. Unfortunately, no comprehensive morbidity statistics are readily available, either from U. S. Census data or from the various factories investigated. Some of the community sickness surveys made

¹"Tuberculosis among Industrial Workers." By Surgeon D. E. Robinson and Assistant Surgeon J.G. Wilson, Public Health Bulletin No. 73, March, 1916.

²Twenty-fifth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey, for the year ending October 31, 1902, p. 371.

by the Metropolitan Life Insurance Company throw a certain amount of light on the problem in respect to particular industries,¹ but these do not specifically cover the boot and shoe industry.

That the shoeworker suffers in time from the effects of his trade, is the opinion of Dr. E. R. Hayhurst,² of the Ohio State Board of Health, after making a survey of various industries in that state in his capacity of Chief of Survey of Occupational Diseases. He held that heart disease, Bright's disease, pneumonia, and tuberculosis are the chief afflictions of the shoeworker, and that he

has them all in a much greater proportion than the average human being. Also, dyspepsia, gall-bladder trouble, and cancer of the stomach and bowel are much more common with him than they should be, while nearly three out of every hundred shoemakers commit suicide. They have an all around higher death rate than farmers by 53%.

The 1907 report of the Massachusetts Board of Health on the sanitary condition of factories and workshops, previously mentioned, stated that while the health of employees in the boot and shoe industry in a large number of establishments appeared to be fair to good, in 85 factories, or 23% of those visited, a considerable proportion of the employees were notably pale and unhealthy in appearance.

THE DUST HAZARD

Certain processes in the boot and shoe industry are characterized by the generation of dust. The use of naphtha cement in several operations in the upper leather department constitutes another health hazard, although the report of the Massachusetts State Board of Health already referred to³ indicated that this could be largely reduced and controlled by the use of covered cans instead of the open bowls which have been frequently used.

¹National Industrial Conference Board, Research Report No. 4. "Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing."

²"Occupational Diseases in their Relation to Rural Districts," by E. R. Hayhurst, A.M., M.D., read before the Conference of Health Officers of the Northern District of Ohio, July, 1913.

³Report of Massachusetts State Board of Health, "Hygiene of the Boot and Shoe Industry in Massachusetts," 1912.

The principal dusty occupations are those of edge trimming, heel shaving, heel scouring, naumkeaging or naumkeag buffing, bottom scouring and finishing, brushing and cleaning. While, however, in some of these processes a considerable amount of dust was generated, it appeared that in many of them it was possible to materially reduce the dust hazard by the use of proper exhaust systems.

The findings of the Board of Health with respect to some of these processes as given in the report cited are briefly epitomized below:

Edge Trimming. After careful investigation of existing conditions, the conclusion was reached that with an efficient hood and exhaust system practically all the dust could be removed.

Heel Shaving. Most of the dust and chips are thrown horizontally or downward; comparatively little reaches the operative's face. The machine is a particularly difficult one to equip properly with an adequate hood and exhaust.

Heel Scouring. Considerable dust is thrown off . . . On account of the small diameter of the cone, and the fact that the dust goes off at a tangent or downward, and as the machine is readily equipped with efficient exhaust blowers, little dust reaches the face of the operative.

Naumkeaging or Naumkeag Buffing. The dust-producing unit is oftentimes within eight or nine inches of the operative's face. If a man is of medium height, or below the average, or nearsighted, he is much exposed to fine carborundum or leather dust. On account of improperly constructed hoods, there is undue exposure to dust from this type of machine.

Bottom Scouring. The operative is exposed to but little dust, owing to the fact that the diameter of the roll is small and the dust generated is thrown downward or at a tangent.

Bottom Finishing. The amount of dust produced is considerable, and the machine is probably the dirtiest in the shoe industry. Practically few of these finishing or polishing machines are connected with blower systems or

efficiently hooded. Another dirty machine of this type is the "upper cleaner." . . . It is practically never provided with a blower system and seldom with an efficient hood.

Xpedite Finishing. When improperly hooded, the machine gives rise to considerable fine dust. . . . On account of the operative's posture and the manner in which he does his work, comparatively little dust reaches his face.

From the foregoing brief summary it is reasonably clear that although considerable dust is generated in these various processes, it is in many cases possible to protect the operative by the adoption of hoods or exhaust systems. It should be noted in this connection that the report just quoted indicated that indifference or carelessness of employees in the use of such preventive apparatus frequently increased the dust hazard beyond a point necessitated by the nature of the operation itself.

The dust hazard has been held responsible by some authorities for the occurrence of much of the tuberculosis which exists among boot and shoe workers. Thus, Dr. F. L. Hoffman, Statistician of The Prudential Insurance Company of America, in a work on "Mortality from Consumption in Certain Occupations," held that:

observations and statistical data, derived from both American and foreign sources, clearly indicate that boot and shoe makers are subject to an excessive mortality from consumption and from other respiratory diseases. The excess in the mortality from consumption is, without doubt, in part, at least, the result of continuous and considerable exposure to organic dust.¹

As noted later,² The Medical Research Committee of Great Britain also regarded the presence of "infected dust" as probably contributing to the disease.

A report on a study of tuberculosis among industrial workers in Cincinnati conducted by officials of the U. S. Public Health Service,³ however, did not ascribe the preva-

¹Bulletin of the U.S. Bureau of Labor, No. 82, May, 1909, p. 603.

²See page 64.

³"Tuberculosis among Industrial Workers." Surgeon D. E. Robinson and Assistant Surgeon J. G. Wilson, Public Health Bulletin No. 73, March, 1916.

In the survey, five large boot and shoe establishments were visited and 3,007 employees examined, of whom 1,847 were males and 1,160 females.

lence of that disease in the boot and shoe industry primarily to the dust hazard, although it was found that some of the processes, unless surrounded by adequate safeguards, undoubtedly predispose to tuberculosis of the respiratory passages through irritation from dust.

The following excerpt from the report may be cited:

The impression gained during the course of the work was that the dusty processes, such as heel trimming, bottom sanding, etc., are apparently no more productive of disease than those which from their nature would seem to be intrinsically less dangerous.

In the factories visited, powerful exhausts were provided to carry off the dust generated in heel polishing and bottom sanding, the two important dust-producing processes, so that there seemed to be but little danger from this source. "In fact," continues the report, "many of the men operating these machines have been thus engaged for many years with apparently no harmful results."

While, therefore, the prevalence of tuberculosis among boot and shoe workers is recognized, there is considerable difference of opinion as to how far the dust hazard is responsible for it.

THE SPEED HAZARD

The report of the U. S. Public Health Service above quoted attached much more importance to the speeding-up of workers than to the dust hazard. On this point it was stated:

One of the most noticeable things about the work in these factories is the high tension at which every one seems to be working, as the work in nearly all instances is piecework and earnings naturally depend on the output. This high-pressure work or speeding, in our opinion, is one of the most important causes of the lowered physical vitality noticed among these workers, as the constant strain of work at top speed, week after week, must tell in the end. . . .

Therefore, the conclusion seems justifiable that most of the tuberculosis chargeable to the working conditions among shoe workers either is the result of overcrowding, with consequent danger of contact infection, or else is due to lowered resistance from

the high pressure or "speeding up" consequent upon the piecework system under which most of the work is carried on.

In this connection, a report of the U. S. Bureau of Labor may be cited as follows:¹

The first impression made upon a visitor is the tremendous speed at which the machines are run. The rate is usually voluntary, yet an ambitious and practised worker is under the temptation of using a speed that strains nerves and eyes.

In considering the factor of speed, however, account must be taken of the rather short hours made by pieceworkers in many establishments, as well as of the somewhat frequent temporary reductions in nominal hours.

The charge of overspeeding is one that is often made by representatives of labor. That speeding up is discouraged by unions is indicated by a statement of a prominent labor leader in the shoe industry, who said in effect:

Fatigue is common among pieceworkers in the boot and shoe industry, especially among lasters, but the piece-rate system which puts an incentive for speeding up before the worker is chiefly responsible for such fatigue. It is not so much a question of overspeeding of machines as of the worker speeding himself up in order to make more money. This is detrimental to the wage-earner. For instance, a girl had made five or six dollars a day at eyelet-row stitching, whereas many girls had left this work because they could not make more than eleven or twelve dollars a week. The girl was remonstrated with on the ground that she was overspeeding.

To some extent, a natural check on speeding up is provided by considerations of the effect which hasty work may have upon the quality of the product. Spoiled work means not only reduced profits for the employer but reduced wages for the employee.

A few extracts from manufacturers' answers to inquiries on this point follow:

¹U.S. Bureau of Labor Bulletin on "The Boot and Shoe Industry in Massachusetts as a Vocation for Women." 1915.

Where a speeding up is noticed among piece-workers, their work is examined very closely for poor work.

In some operations, as cutting, the men cannot speed up without spoiling the quality of the work.

The workers run quite regularly on output, and cannot be speeded up without slighting the work.

MONOTONY, NOISE, AND VIBRATION

The element of monotony presents a rather serious problem as bearing upon the general attitude of workers, and ultimately, perhaps, upon their health. Owing to an increasing specialization in the industry, a given individual seldom performs more than a single operation. As an illustration of the resultant monotony, it is said that the mere changing from coarse to fine leather is a source of pleasure to the operative.

On this point the U. S. Bureau of Labor¹ stated, in a report on the boot and shoe industry in Massachusetts, "that the pauses so frequent in the stitching rooms, though they mean financial loss, are a relief to the strain, and break the wearisome monotony of making the same number of stitches hour after hour on bits of leather identically the same." Furthermore, the report stated:

The monotonous, often nerve-wearing, character of the work is the real cause of what sometimes appears caprice in throwing up jobs. To get out and hunt for another kind of operation or to work in different surroundings is a coveted relief. Change of occupation within the same factory is often desired, especially by handworkers. . . . Of 300 women interviewed, nearly 80 gave as a reason for leaving a job, "tired of it." On the whole, however, there is as much variety in the shoe work as in the clothing trades, and far more than in the textile mills or in the majority of other factory trades.

The problem of monotony in the industry suggests the possibility of relief by the introduction of brief but systematized rest periods within the working day. Experiments with such rest periods in British munition factories during the present war produced interesting results, not only in lessening fatigue, but at times in increasing the day's total output.² Since, however, there are

¹"The Boot and Shoe Industry in Massachusetts as a Vocation for Women." 1915.

²National Industrial Conference Board Research Report No. 2. "Analysis of British Wartime Reports on Hours of Work as Related to Output and Fatigue."

numerous pauses in the course of boot and shoe manufacturing, due to waiting for material or to other interruptions, it may be that greater relief to the worker and better results from the standpoint of production would be secured by occasionally varying the occupation.

With respect to noise, the Bureau of Labor report stated that to a visitor the chief evil seemed to be the racking noise, although "the workers themselves become used to it, declare that they do not mind it, and deny that it makes them nervous," notwithstanding the fact that noise and mechanical rhythm have been found to produce injurious effects upon the nervous system and special senses.¹ In the case of the boot and shoe operatives interviewed, the chief regret was "that the effort to be heard in the workroom makes their voices loud, high pitched, and harsh."

Machine vibration, especially in connection with the leveling machine, used in shaping and leveling soles, has been regarded by some observers as a source of fatigue.

In the U. S. Public Health Service Report² previously mentioned, fatigue as a result of machine operation is referred to as follows:

Two processes that are a great tax on the physical energy are the operating of the "nigger-head" and leveling machines. It requires a man physically fit to operate these machines for any length of time. It is "a man's job," as the shoe workers say.

In nearly all the processes in which the male employees are engaged, including the above, cutting, edge-setting, etc., the worker must be on his feet all the time, while the opposite holds with the female workers, as the majority of these are employed in doing the sewing on the uppers and can sit at their work at the machines, all of which are operated by electric power. Although, because of this, the element of fatigue is not so powerful a factor among the females as among the males, the faulty attitude assumed by the girls while working at the machines should be taken into consideration when comparing the occupation hazard between the sexes.

¹"Health Insurance," Warren and Sydenstricker, Public Health Bulletin No. 76, March, 1916.

²"Tuberculosis among Industrial Workers." By Surgeon D. E. Robinson and Assistant Surgeon J. G. Wilson, Public Health Bulletin No. 73, March, 1916.

MORTALITY RATES AMONG BOOT AND SHOE WORKERS

Mortality statistics are an uncertain test of health conditions, but such statistics indicate that health hazards in the boot and shoe industry, taken collectively, compare favorably with those in other leading factory industries. However, there is evidence that the death rate from certain causes is high; this is particularly true of tuberculosis and, to a less extent, of heart disease.

The following table, compiled from Census data, shows, for selected age groups, the percentage of deaths from certain causes in the total mortality among boot and shoe workers, together with similar percentages for all manufacturing and mechanical pursuits taken collectively.

TABLE 15: PERCENTAGE OF DEATHS OF MALES DUE TO CERTAIN CAUSES, FOR BOOT AND SHOE MAKERS AND REPAIRERS AND FOR WORKERS IN ALL MANUFACTURING AND MECHANICAL PURSUITS, BY SELECTED AGE GROUPS. U. S. CENSUS MORTALITY STATISTICS, 1909.

Cause	All ages 10 years and over		25 to 34 years		35 to 44 years		45 to 54 years	
	Boot and Shoe	All Mfg. & Mech.	Boot and Shoe	All Mfg. & Mech.	Boot and Shoe	All Mfg. & Mech.	Boot and Shoe	All Mfg. & Mech.
Tuberculosis of the lungs	13.4	15.5	35.5	30.8	31.9	25.0	16.8	15.6
Heart disease . .	13.7	11.4	7.0	4.8	9.2	7.2	10.0	10.7
Apoplexy and paralysis	10.0	7.2	1.2	1.1	3.1	2.6	7.1	5.7
Bright's disease .	10.1	8.6	4.3	3.8	5.4	6.5	14.8	9.7
Pneumonia	8.5	7.9	7.4	7.0	9.6	9.1	13.0	9.0
Cancer	5.0	5.6	1.2	1.5	3.1	3.6	4.4	6.6
Other diseases of nervous system	2.9	2.4	2.0	2.2	3.1	2.7	3.0	2.5
Other diseases of circulatory system	4.4	4.0	2.7	1.4	1.5	2.2	2.7	3.4
Cirrhosis of the liver	2.2	1.9	1.2	.8	1.5	1.9	2.1	2.8
Alcoholism	1.1	.9	1.6	.8	4.2	1.6	1.8	1.4
Diabetes	1.1	1.1	1.2	.8	1.9	.8	.3	1.1
Typhoid fever . .	1.1	2.0	4.7	4.7	1.5	2.5	.6	1.4
Occupational and chronic poison- ings . . . . .	.1	.1	.0	.1	.4	.1	.0	.2
Suicide	2.8	2.8	3.9	4.0	5.4	3.6	5.3	3.8
Accidents	4.0	11.1	7.8	20.8	5.4	15.6	3.0	10.1
Unclassified and unknown causes	19.6	17.5	11.3	8.2	7.7	7.1	9.2	7.3

This table clearly indicates a relatively high death rate among boot and shoe workers from tuberculosis as compared with the average rate for all mechanical and manufacturing industries collectively. The average for all age groups, it is true, is lower for boot and shoe workers than the combined average for workers in all manufacturing and mechanical industries. Such consolidated death rates, however, are very likely to be misleading, and it is necessary to make comparisons for similar age groups.

For the most productive age periods, i.e., from twenty-five to fifty-four years, the tuberculosis death rate among boot and shoe workers is in every instance higher than the combined average for all manufacturing and mechanical industries. The rate for heart disease is higher up to forty-five years.

Dr. George W. Kober, in "Diseases of Occupation and Vocational Hygiene," states that diseases of the heart are unusually common in the boot and shoe industry, 15.5% against an average of 10.8% in other occupations. Comparisons for heart disease are, however, of doubtful validity, since many diseases formerly classed under this head are now given a more specific designation as a result of improvements in methods of diagnosis.

MORTALITY FROM TUBERCULOSIS

In the case of tuberculosis, the evidence is reasonably clear that the industry itself is partly responsible.

In 1909 the Massachusetts Bureau of Labor, in a bulletin on "Tuberculosis in the Industries of Massachusetts," stated in part:

In the city of Brockton (in three years) of 167 deaths occurring among shoemakers, 42, or 25 per cent of the whole, were due to pulmonary consumption; and of this number the proportion of those dying below the age of thirty years was 36 per cent. There were 61 deaths from consumption plus other diseases of the lungs, or 36.5 per cent of the entire mortality.

In Lynn, during the same three years, of 297 deaths among shoemakers, 65, or 22 per cent, were due to consumption plus other lung diseases. More than one-half (55.4 per cent) of those who died from consumption had not yet attained their thirtieth year. . . .

A high death rate from tuberculosis is characteristic of boot and shoe workers in Great Britain. The following

table¹ compares the death rate of shoemakers from pulmonary tuberculosis and respiratory diseases in England and Wales for the period 1900–1902 with the similar death rate for all occupied males:

TABLE 16: MORTALITY OF SHOEMAKERS FROM PULMONARY TUBERCULOSIS AND RESPIRATORY DISEASES, ENGLAND AND WALES, 1900–1902. RATES PER 1,000 BY AGE GROUPS.

Mortality from Pulmonary Tuberculosis				
Ages at Death	Death Rate per 1,000 for all Occupied Males	Rate per 1,000 Boot and Shoe	Greater (+) Less (—) than Rate for all Occupied Males	Ratio to Rate for All Occupied Males
15–19	0.54	1.01	+ 0.47	187
20–24	1.55	2.90	+ 1.35	187
25–34	2.03	3.18	+ 1.15	157
35–44	2.74	4.24	+ 1.50	155
45–54	3.04	4.18	+ 1.14	138
55–64	2.16	2.57	+ 0.41	119
65+	1.11	1.59	+ 0.48	143
Mortality from Respiratory Diseases				
15–19	0.24	0.14	— 0.10	58
20–24	0.48	0.46	— 0.02	96
25–34	0.77	0.56	— 0.21	73
35–44	1.66	1.30	— 0.36	78
45–54	3.32	2.80	— 0.52	84
55–64	6.54	5.54	— 1.00	85
65+	17.77	17.34	— 0.43	98

A similar comparison covering the years 1890–1892 also showed an excess in the death rate from pulmonary tuberculosis among shoemakers as compared with that among all occupied males for every age group. In the main, the excess was somewhat greater than that shown by the table just presented for the years 1900–1902.

A report of the Medical Research Committee of Great Britain on phthisis in the boot and shoe industry, issued in 1915, showed the death rate from the disease in that country to be distinctly high. Although differences in nationality, wages, standards of living, and various other conditions, prevent application of the British results directly to the industry in this country, yet, considering that the methods of manufacture are substantially similar,

¹This table was furnished by Dr. Frederick L. Hoffman, Statistician of The Prudential Insurance Company of America.

some of the committee's comments are pertinent at this time. The summary of conclusions was as follows:

- (1) Phthisis is specially prevalent among workers in the boot and shoe industry, as compared with the general population.
- (2) The individual worker is predisposed to infection by the sedentary nature of his employment, and possibly by the attitude he adopts at work.
- (3) The infection is probably
 - a. increased by the number of infective workers, and
 - b. favored by want of light, the presence of infected dust, and inadequate ventilation in the workrooms.

In discussing the causes of phthisis in the boot and shoe industry, the committee said, in part:

The introduction of machinery has affected the posture of the workers considerably in the making-up department (lasters), and, to a less extent, in the finishing department. The laster used to sit at a bench and tuck the last into his chest; now, although some lasting is still done in the old way, he usually stands at a machine. The available statistics appear to show that synchronously with this alteration in posture the phthisis mortality has fallen in this department, but, as pointed out already, the numerical data do not allow positive conclusions to be drawn. No such fall appears to have occurred in the finishing department. The posture of the clicker has not altered in recent years, and his mortality does not appear to have fallen. The clicker as he leans over his cutting board compresses his abdomen and lower ribs and interferes with diaphragmatic breathing, while at the same time the lift of the upper ribs is impeded because the shoulder girdle must be fixed to support the action of the arms when the pattern is held down and the leather cut; today, the benches provided are of the same height for all operatives irrespective of stature, and the cutting boards, which are usually raised (but seldom sufficiently) by the men themselves, are flat.

Although this question of cramped position of the chest may be of importance among males, it does not seem to affect females in the closing department, who work at sewing machines. Yet the phthisis mortality among these workers is high.

ACCIDENT HAZARD IN THE BOOT AND SHOE INDUSTRY

The accident hazard in the boot and shoe industry unquestionably is low. The Census mortality statistics given on page 62 show that only 4 per cent of the total deaths of workers in this industry were due to accidents, as against a combined average of 11.1 per cent for workers in all manufacturing and mechanical industries. For age groups twenty-five to thirty-four years, the percentage of total accidental deaths in the boot and shoe industry was 7.8 as against 20.8 for all manufacturing and mechanical industries combined. A low accident hazard in the industry is, moreover, clearly indicated by workmen's compensation rate schedules. In the Massachusetts Rate Manual, boot and shoe workers take a rate of 41c per hundred dollars of payroll as compared, for instance, with rates of 72c in rubber boot and shoe making, 88c in cotton spinning and weaving, \$3.33 in rolling mills, and even higher rates in various other occupations in the iron and steel industry.¹ It is obvious, therefore, that with respect to the accident hazard, the boot and shoe industry ranks very favorably.

¹A comparison of a few of the Massachusetts rates follows:

Silk manufacturing	\$.29
Linotype and hand composition . . . . .	.35
BOOT AND SHOE . . . . .	.41
Cotton yarn manufacturing . . . . .	.66
Printing . . . . .	.66
Rubber boot and shoe manufacturing . . . . .	.72
Wool spinning and weaving . . . . .	.79
Cotton spinning and weaving . . . . .	.88
Cloth printing . . . . .	.97
Shoe findings manufacturing	1.00
Shoe stock manufacturing	1.16
Rubber tire	1.28
Electric apparatus manufacturing	1.28
Machine shop, without foundry	1.47
Wool pulling	1.47
Wool scouring	1.47
Textile dyeing, finishing, and printing	1.59
Iron foundry	1.68
Wool combing	1.99
Blacksmithing and shoeing	2.09
Can manufacturing	2.30
Paper manufacturing, excepting writing and bond and ledger	2.30
Wool separating (chemical)	2.40
Boilermaking	3.05
Steel castings	3.33
Rolling mills	3.33
Pulp manufacturing, sulphite process, no saw or barking mills	4.38
Saw and barking mills	6.64
Blast furnace operatives	6.95

CONCLUSIONS AS TO HEALTH

It appears, therefore, that factory conditions in the boot and shoe industry with respect to such matters as ventilation and lighting are generally favorable, that the accident hazard is distinctly low, and that the average death rate is about normal. The death rate from tuberculosis, however, is high. Without extensive investigation it would be impossible to determine to what degree this high death rate from tuberculosis is definitely due to conditions inherent in the industry, rather than to such factors as race, living conditions, or other causes. The fact, however, that the rate is high, not only in this country, but in Great Britain as well, points clearly to the conclusion that the industry itself is partly responsible. Consideration should also be given, however, to the fact that differences in race, in geographical location, in wages, in factory and housing conditions, and a great number of other factors, have an important bearing upon the problem.

Whether a general shortening of hours to 52 or 50 per week would appreciably affect the death rate from tuberculosis or otherwise improve health conditions in the industry is a matter on which no really valuable opinion can be rendered until more specific information has been assembled. The data necessary for drawing satisfactory deductions are not at present available. Apparently there is no important difference in health conditions as between a 50 or a 54-hour week, but this cannot be asserted as a fact from the limited experience available. A reduction in speed, or an adjustment of machines so as to improve the posture of workers while engaged at their tasks, might be productive of more benefit than a shortening of hours. Or, if a shortening of hours is the proper remedy, the devotion of a half-hour per day to systematized rest periods might accomplish much more than the elimination of a half-hour at the end of the day.

It may prove that conclusive results can be reached only by experience on a large scale, or, again, that the remedy lies chiefly in correcting influences outside the factory. Whatever the most effective method may be, however, it is clear that the high death rate from tuberculosis in the boot and shoe industry calls for still further intensive investigation with a view, first, to fixing definitely the responsibility, and then to applying the proper remedy.

Appendix

The following table gives the important data submitted by those establishments which reported the effects on output accompanying reduction in work hours. For convenience, the information is assembled by hour groups and the establishments classified according to the effect on production. It should be noted that in several cases companies reporting a decrease in production for the establishment as a whole, nevertheless stated that the output of pieceworkers, who on an average constitute about 68% of the working force, was either maintained or not seriously affected.

In many cases, the reduction in hours was effected by the introduction of a Saturday half-holiday; in others, it was distributed through the week. The method of reduction has been indicated in this table by the letter "S" for those establishments which accomplished the reduction in hours by means of a Saturday half-holiday, and by the letter "X" for those in which the reduction was distributed through the week. Many establishments making the distribution by the latter method, it should be noted, had already introduced the Saturday half-holiday.

In examining the data given in the column "Change in Wages," the distinction between total wages and rates of wages must be kept clearly in mind. The statement that there was no change in piece or hourly rates when hours were shortened, means that the weekly total was reduced for dayworkers and also for pieceworkers unless these increased their output.

REDUCED TO 48 HOURS Production Maintained

No. of Establishments	1
Total No. Employees	200

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
—	200	S	Piece and hourly rates increased proportionately.	Production was maintained with the shorter hours although costs were somewhat raised.

Production Decreased

No. of Establishments	1
Total No. Employees	12,000

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
52	12,000	X		It is safe to say that at least 50% of the time given is probably made up in more efficient service, and the other 50% is probably additional cost. (See page 25.)

REDUCED TO 49½ HOURS Production Maintained

No. of Establishments	2
Total No. Employees	598

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
55	295	X	No change in piece or hourly rates. ¹	No change in output to date.
54	303	S	10% bonus for both time and piece workers.	No marked effect on total output per employee.

Production Decreased

No. of Establishments	2
Total No. Employees	433

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
55	255	X	No change in piece rates. ²	Production was cut down and cost increased.
54	178	S	No change in piece rates. ²	Falling off in volume of output on the part of time workers. Very slight decrease on the part of piece-workers.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, the wages of women week-workers were reduced to a 50-hour basis.

²In this establishment, hourly rates were increased proportionately.

REDUCED TO 50 HOURS

Production Maintained

No. of Establishments	3
Total No. Employees	1,983

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
57½	59	S	No change in piece or hourly rates.	Reduction in hours made on account of slack work. There was no decrease in output.
55	1,661	X	No change in piece rates; some increase in day wages.	No decrease in production.
55	263	X	No change in piece rates. ¹	The same total output per employee for piece and time work.

Production Decreased

No. of Establishments	26
Total No. Employees	20,045

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
58	431	S	No change in piece rates. ¹	Labor cost increased 7%.
55	650	X	Increase.	Loss in product was in direct proportion to the reduction in hours.
55	184	X		No noticeable change in output or costs for piecework; 10% decrease in output for daywork.
55	946	S	All were paid on a 55-hour basis for 50 hours' work.	Decreased production per man. Employed enough extra to offset the difference in hours worked.
54	502	S	10% increase in piece and hourly rates.	Labor cost per unit of product increased 10% for piece and day work.
54	800	S	10% increase.	Production was reduced in about the same proportion as the working hours.
54	125	S	10% increase.	Production decreased 12½ to 13%.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
54	880	S	10% increase in piece and hourly rates.	Total output per employee decreased and labor cost per unit of product increased.
54	513	S	10% increase in piece rates. ¹	Output decreased.
54	309	S	10% increase.	The employees have speeded up. The output per hour has increased somewhat, although as yet not quite enough to maintain the same production as during the 54-hour week.
54	810	S	10% increase.	The output per individual decreased in almost exact proportion to the reduction of hours.
54	585	S	10% increase in piece and hourly rates.	With the shortening of the week the number of day-workers had to be increased to attain the same output. Pieceworkers have maintained practically the same output for the shorter week.
54	241	S	10% increase in piece and hourly rates.	Total output per employee decreased, particularly where day labor is employed.
54	2,400	S	10% increase in piece and hourly rates.	Output per week was reduced as there was no apparent effect on hourly production.
54	797	S	10% increase in piece and hourly rates.	8% decrease in output and 10% increase in cost.
54	225	S		Decrease in output. For perhaps a week there was speeding up and then the old gait was resumed.
54	614	S		The operatives did not make up the difference in time.
54	160	S		Loss in output was about 75% of the loss in time.

*S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
54	300	S		About 5% decrease in output.
54	3,000	S	Increase.	Quite appreciable reduction in output.
54	366	S	10% increase in piece and hourly rates.	8% decrease in output and 3% increase in labor cost for time work. No change in output for piecework.
54	3,150	S	10% increase to all employees.	Additional help and more manufacturing space required to produce the same amount of shoes under a reduction in working hours.
54	843	S	10% increase in piece and hourly rates.	12% decrease in total output per employee and 10% increase in labor cost per unit of product.
54	503	S	10% increase in piece and hourly rates.	Reduction in output.
54	216	S	10% increase in piece and hourly rates.	A substantial reduction in output.
54	495	X	Irregular advances.	Output reduced 10%.

REDUCED TO 52 HOURS Production Maintained

No. of Establishments	3
Total No. Employees	7,563

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
55	6,934	X	10% bonus system introduced.	Production per hundred employees, for the four months immediately following the reduction in hours, was increased.
55	206	X	Piece and hourly rates increased.	No change in production.
54	423	S	No change in piece rates. ¹	No important effect. Labor cost practically unchanged.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

REDUCED TO 52 HOURS — Continued

Production Decreased

No. of Establishments 3
Total No. Employees 1,272

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
55	440	X	Increase in piece and hourly rates.	9% decrease in output and 10% increase in cost.
55	500	X		Decrease in output.
54	332	X	No change in piece rates. ¹	Total output per employee decreased 10%. Labor cost per unit of product increased 10%.

REDUCED TO 52½ HOURS

Production Maintained

No. of Establishments 4
Total No. Employees 1,577

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
57½	33	X	Pro rata increase in piece and hourly rates.	About the same production as for the longer day.
55	1,434	X	No change in piece rates. ¹	Substantially no change in the total output per employee.
55	80	X	No change in piece rates. ¹	Conducive to better conditions and more contentment. Payrolls show equal earnings with those made during longer hours.
55	30	X	No change in piece rates. ¹	The same total output per employee for piece and day work.

Production Decreased

No. of Establishments 3
Total No. Employees 941

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
60	200	S		The reduction brought a decrease in output greater than the decrease in hours.
55	298	X	No change in piece rates. ¹	This reduction resulted in an increased cost of production without any increase in hourly output.
54	443	X	No change in piece rates. ¹	No change in output or labor cost for piecework. 5% decrease in output for daywork.

*S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

REDUCED TO 53 HOURS Production Maintained

No. of Establishments	1
Total No. Employees	171

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
58½	171	X	10% increase in piece and hourly rates.	Reduction in hours did not affect output.

REDUCED TO 54 HOURS Production Maintained

No. of Establishments	6
Total No. Employees	5,904

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
60	203	X	No change.	The reduction in hours had practically no effect on average total output per employee.
60	4,129	X	No change in piece rates. ¹	Reduction in output was very slight if there was any at all.
58	1,004	X	Dayworkers received the same wages.	Production was not affected by reduction in hours.
58	252	S	No change in piece rates. ¹	No noticeable change in output or labor cost.
58	94	S	No change in piece rates. ¹	Production remained about the same. Slight increase in costs where day help is employed.
—	222	X		No notable effects.

Production Decreased

No. of Establishments	13
Total No. Employees	4,991

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
60	195	S	No change in piece rates. ¹	Labor cost increased 8%.
60	72	S	Piece and hourly rates increased.	Same output for piecework; decrease for daywork.
60	127	S		Falling off in production and a corresponding increase in cost of production.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
60	110	S	No change in piece rates. ¹	The output remained the same per hour and therefore the total output decreased in proportion to the hours reduced.
60	405	X		Total output was less.
59	96	S	No change in piece rates. ¹	Labor cost per unit of product increased 9% for daywork, no change for piecework.
59	1,198	S	Hourly rates increased.	Total output per employee decreased about 8% for piece, and about 10% for daywork.
58½	175	S	Wage increase slightly more than the reduction.	Weekly output was reduced.
58	336	S	No change in piece rates. ¹	Increased cost of production.
58	1,646	S	No change in piece rates. ¹	The reduction from the former 58-hour week resulted in a decrease of about 3½ hours' production per week, adding about 7% to the cost of production.
58	181	S	No change in piece rates. ¹	Less production.
57	405	X	No change in piece rates. ¹	Loss in output. There was no apparent reduction in piecework operations.
—	45	S	No change in piece rates. ¹	Total production per employee decreased for both time and piecework.

REDUCED TO 55 HOURS

Production Maintained

No. of Establishments	3
Total No. Employees	615

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
60	95	X	Gradual increase in time and piece rates.	No apparent decrease in output.
60	83	S	No change in piece rates. ¹	No appreciable effect on output.
—	437	S	No change in piece rates. ¹	No special effects as most of our employees work by piece.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

REDUCED TO 55 HOURS — Continued

Production Decreased

No. of Establishments	5
Total No. Employees	2,899

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Es tablishments
59	693	S	No change in piece or hourly rates.	About 5% less output.
59	367	S	No change in piece or hourly rates.	Decreased production and slightly increased cost.
59	1,250	S		A proportionate amount of product was lost.
58	164	S	No change in piece rates. Three hours' pay deducted from timeworkers.	We estimate that the three hours shortened time has resulted in actual loss of output.
58	425	S		Increased the cost of production.

REDUCED TO 56 HOURS

Production Maintained

No. of Establishments	1
Total No. Employees	1,008

Previous hours	No. employees	Method of reduction*	Change in wages	Statement of Establishment
58	1,008	S	No change in piece rates. ¹	Closer application to work gave us more and better results on a shorter schedule.

* S indicates that the reduction in hours was effected by means of a Saturday half-holiday.

X indicates that the reduction in hours was distributed through the week.

¹In this establishment, hourly rates were increased proportionately.

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